VOLUME XLII NUMBER THREE

THE NATIONAL GEOGRAPHIC MAGAZINE

SEPTEMBER, 1922

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TO carry out the purposes for which it was founded thirty-four years ago, the National Geographic Society publishes this Magazine. All receipts are invested in the Magazine itself or expended directly to promote geographic knowledge.

ARTICLES and photographs are desired. For material which the Magazine can use, generous remuneration is made. Contributions should be accompanied by an addressed return envelope and postage.

IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resultant given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over $50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization which was waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the historic expedition of Admiral Peary, who discovered the North Pole.

NOT long ago The Society granted $25,000, and in addition $75,000 was given by individual members through The Society to the Federal Government when the congressional appropriation for the purchase was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people and incorporated into a National Park.

THE Society is conducting extensive explorations and excavations in northwestern New Mexico, which was one of the most densely populated areas in North America before Columbus came, a region where prehistoric peoples lived in vast communal dwellings whose ruins are ranked second to none of ancient times in point of architecture, and whose customs, ceremonies and name have been engulfed in an oblivion more complete than any other people who left traces comparable to theirs.

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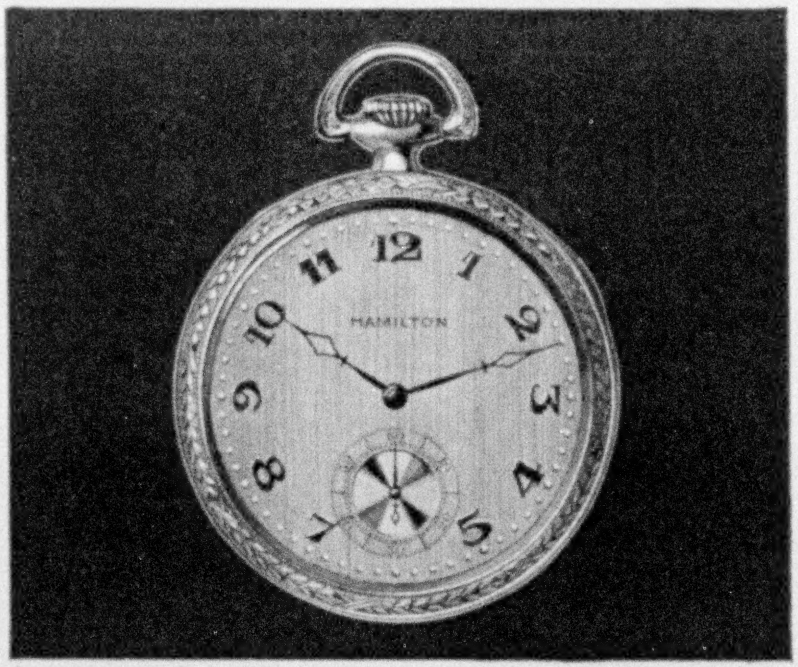

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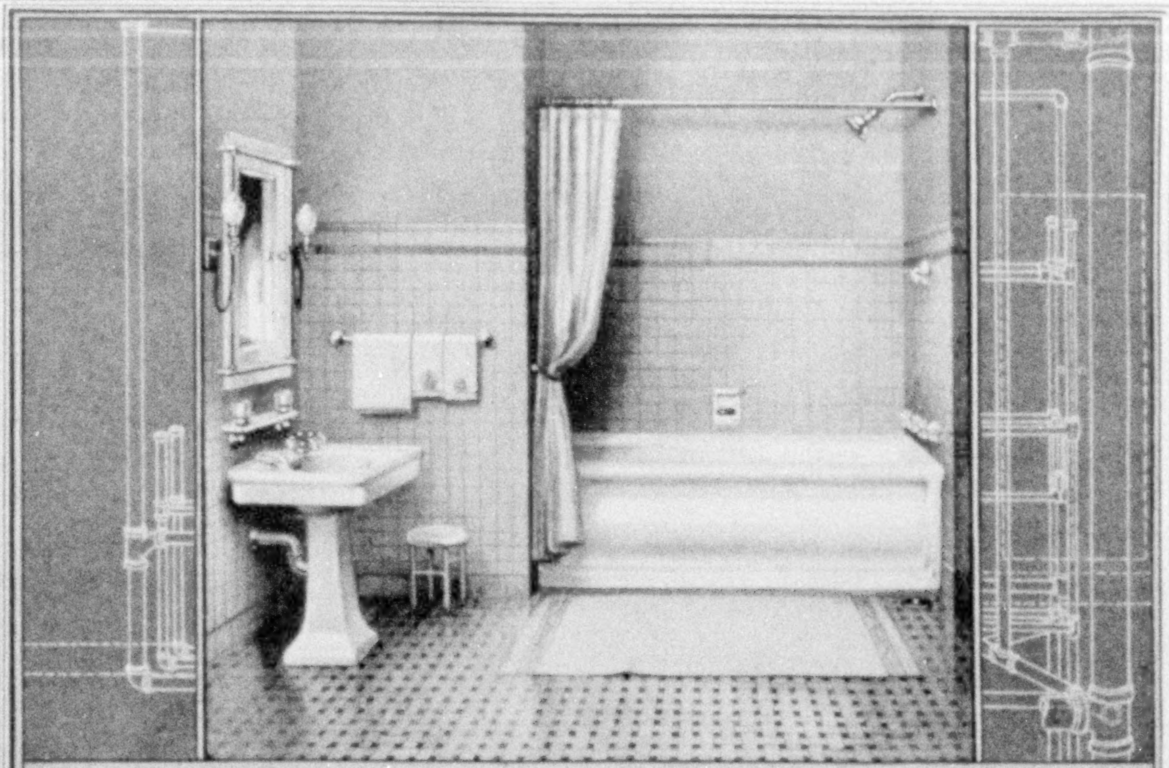

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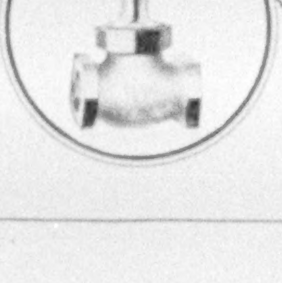

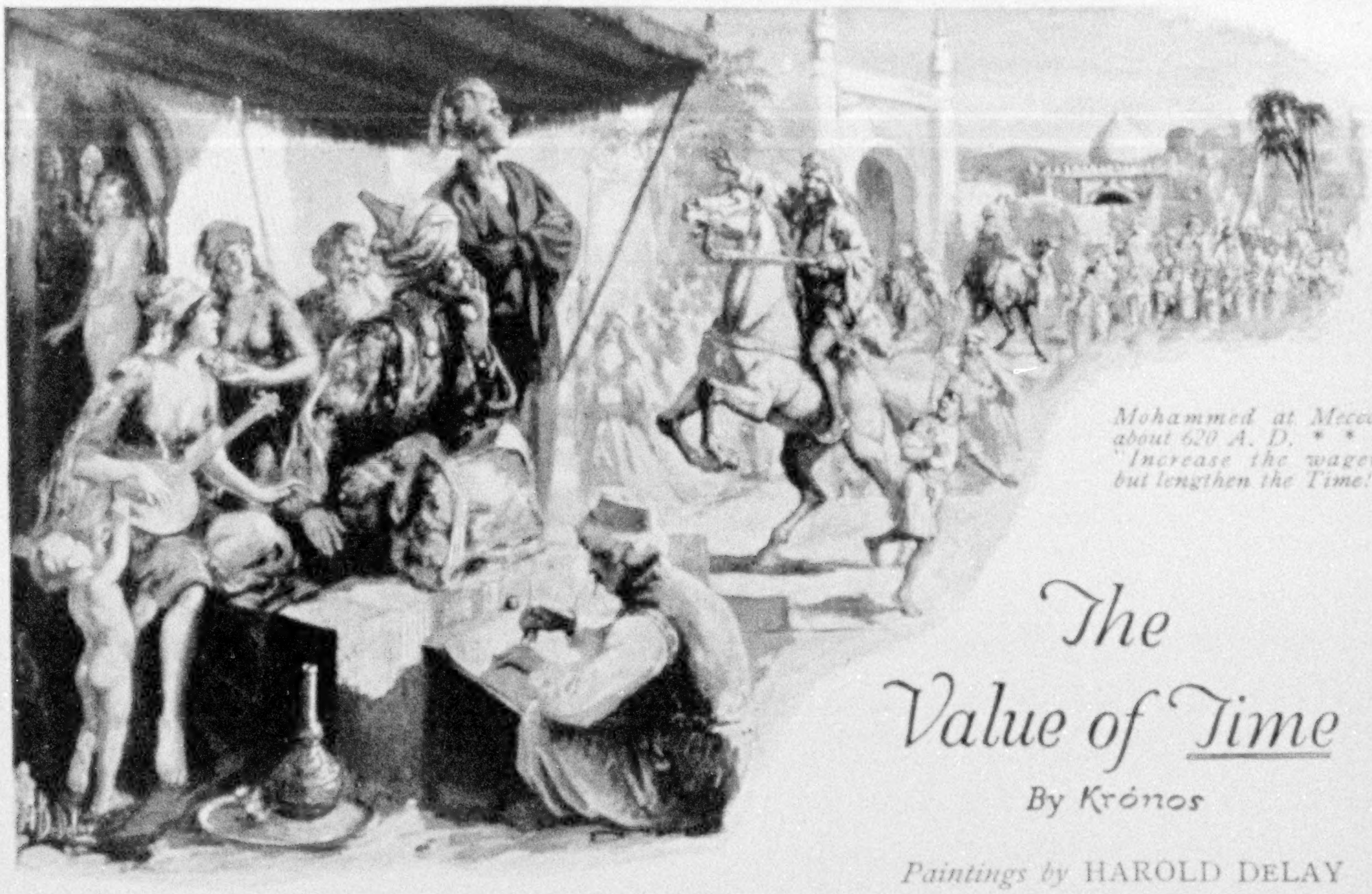

Mohammed at Mecca, about 620 A. D. * * * *"Increase the wager, but lengthen the Time!"*

The Value of Time

By Krónos

Paintings by HAROLD DELAY

Below, at right, three views of Elgin Presentation Watch with "Mecca" Bow, $325 * *The Presentation Series embodies the new 19-Jewel C. H. Hulburd Movement, 12-size bridge model, extremely thin.*

All watches of this new series have the Invar-Steel Balance, which minimizes temperature variation and makes for remarkably accurate timekeeping.

Each Presentation Watch is an individual creation. Cased in a pleasing variety of exclusive designs, in White, Green and Yellow Gold—$325 to $500 * * *The Elgin Presentation Series is considered the last word in the Gift Idea as applied to modern business and social requirements.*

TO MOHAMMED, life was a waiting game. Time lifted him from poverty to power. Like Caesar, he sensed Time's value to the full, but for the Roman's whirlwind dispatch he substituted the patience of the Orient. "Now!" was Caesar's watchword. "*Wait!*" was Mohammed's.

An Arab rival ridiculed Mohammed's prophecy of the end of Persian domination. "Master," cried Abu, the Prophet's zealous bodyguard, spurring hotly through the gates of Mecca, "I have wagered him ten camels that it will come true within three years!"

"Increase the wager," came the Prophet's crafty whisper, "but *lengthen the Time!*" Abu promptly trebled the Time and staked *one hundred* camels—and won!

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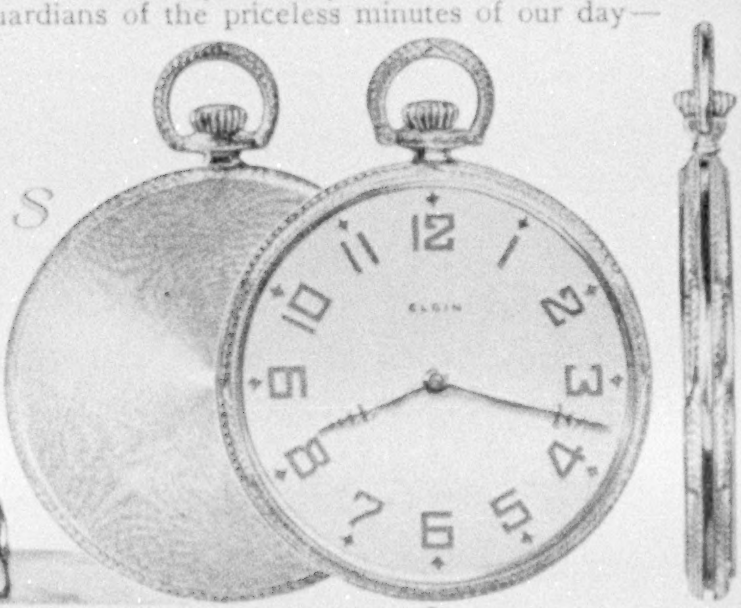

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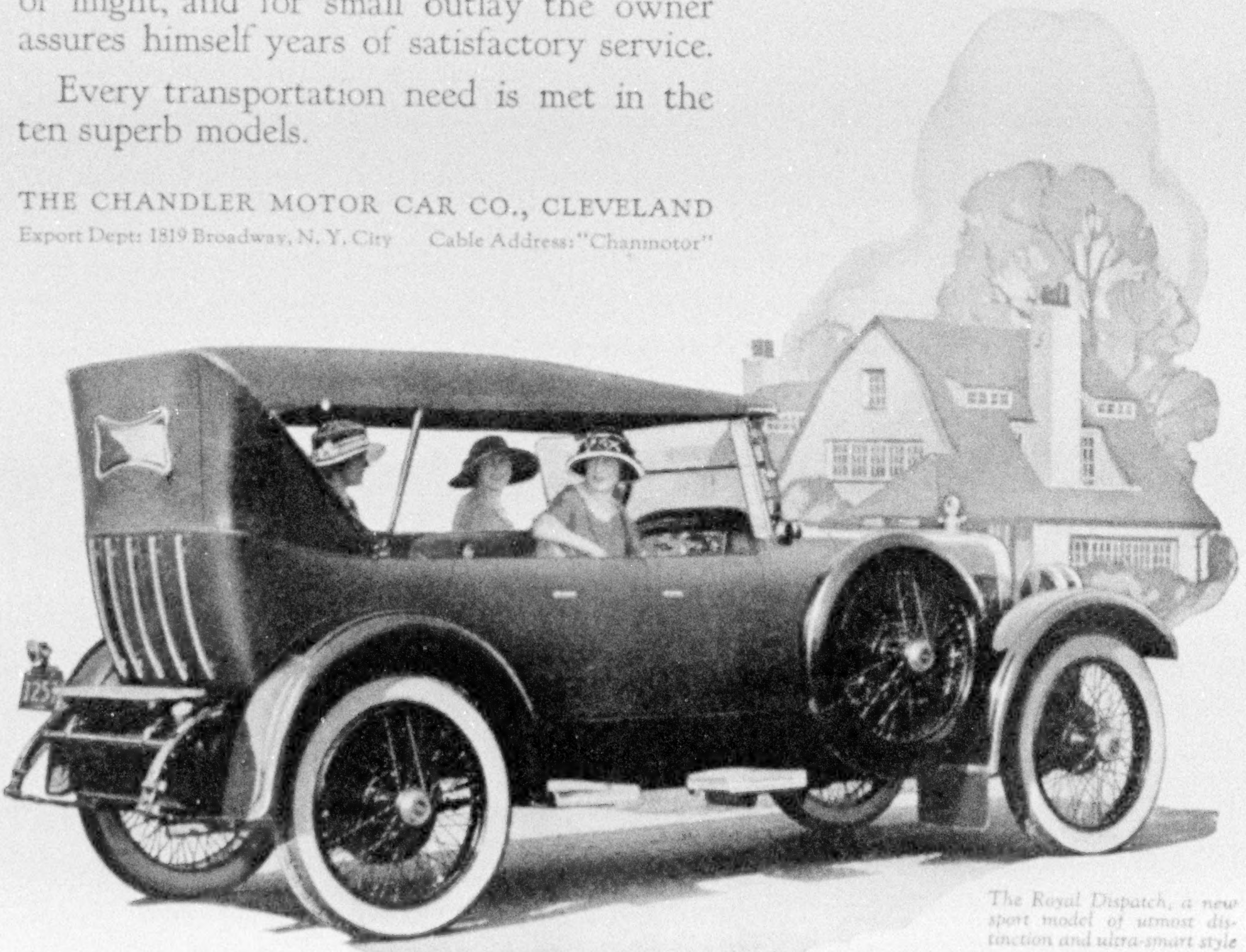

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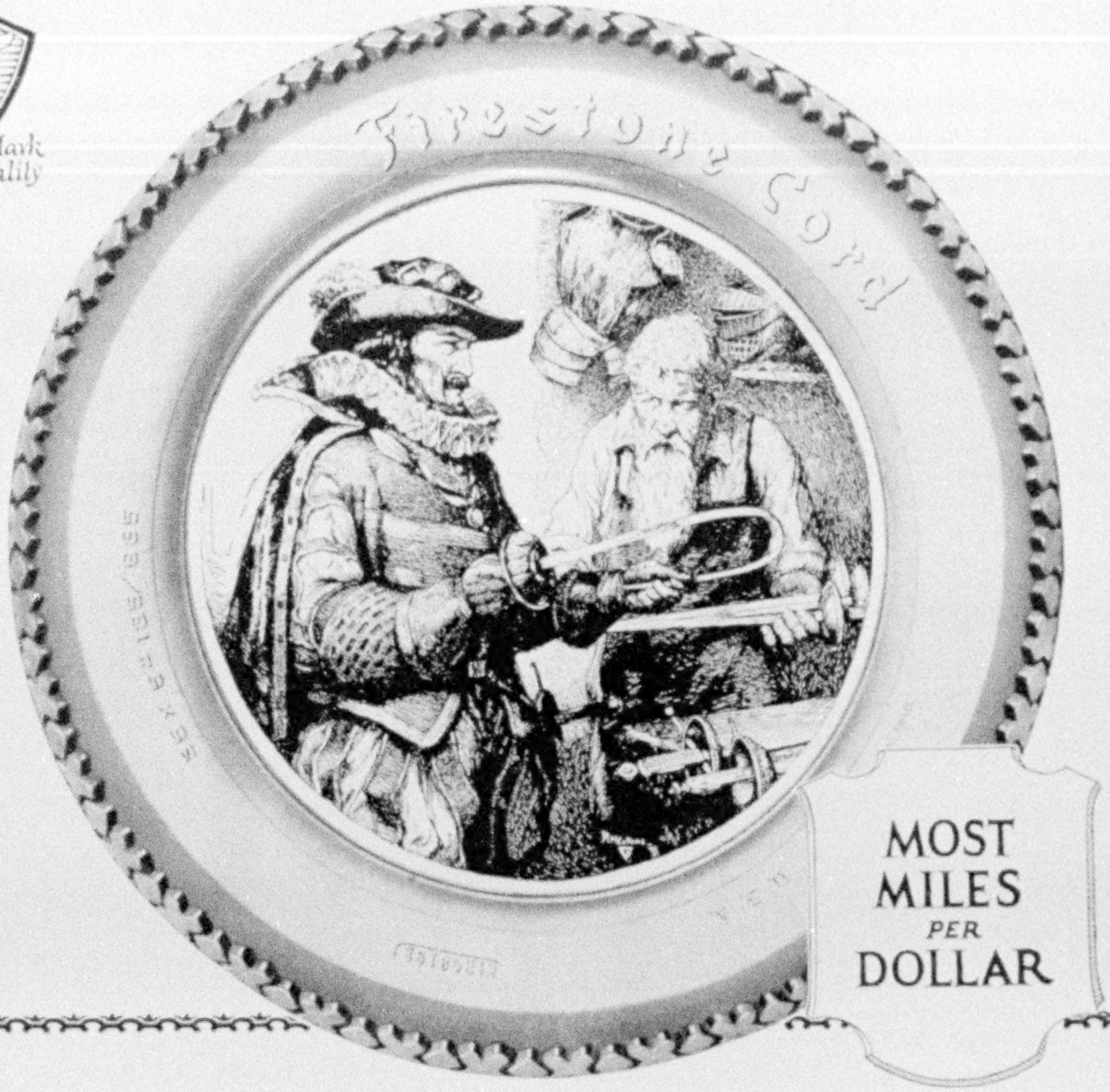

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The price is $980 f. o. b., Detroit

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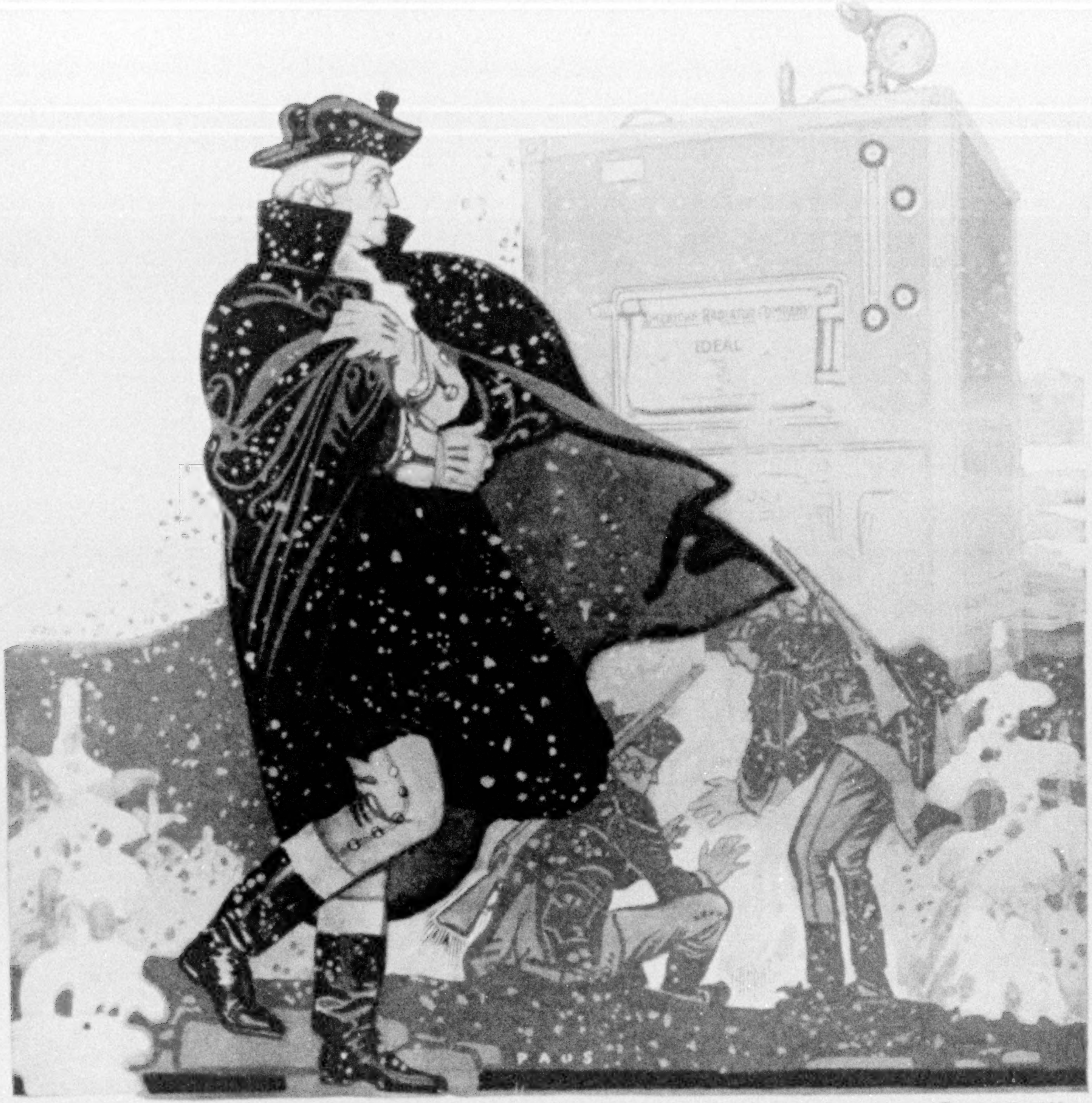

From a painting
by Herbert A. Paus

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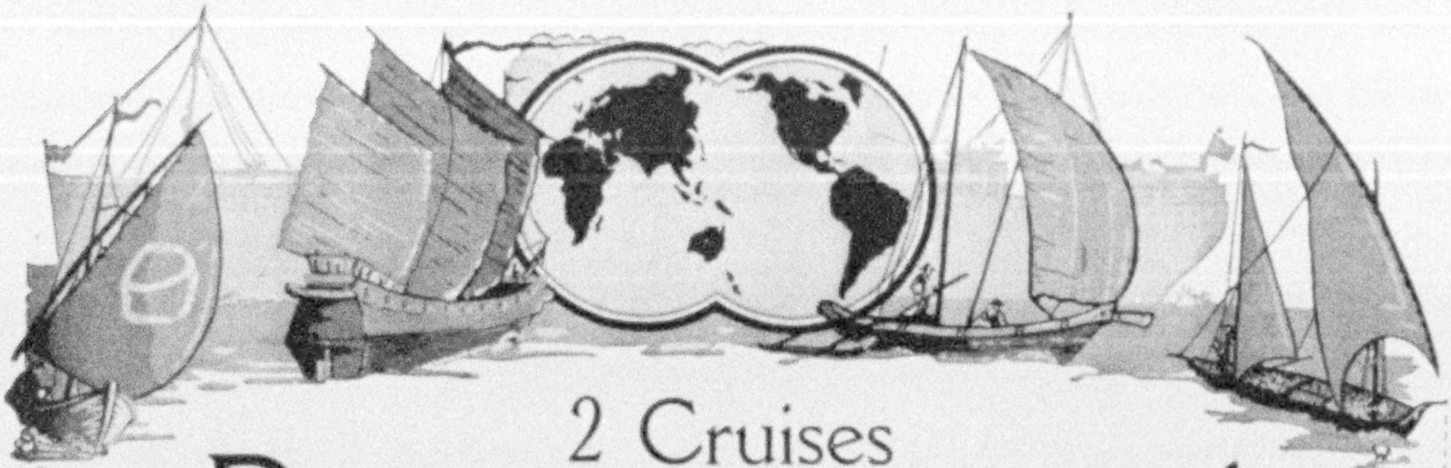

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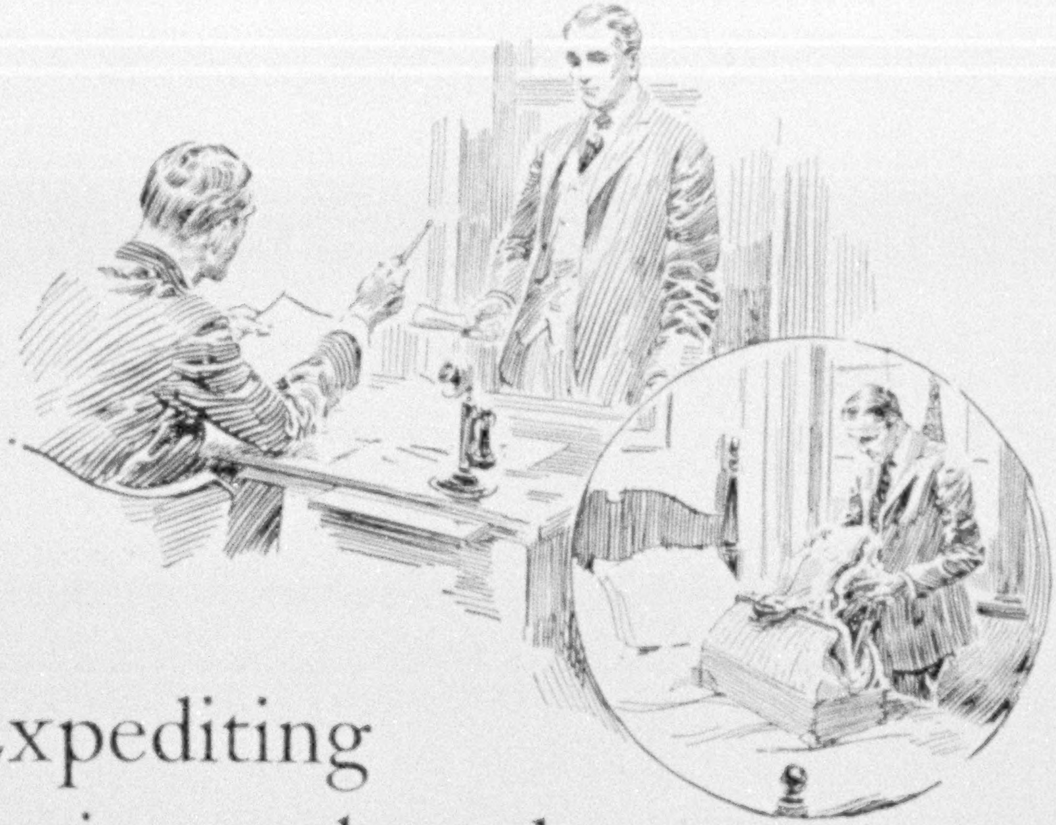

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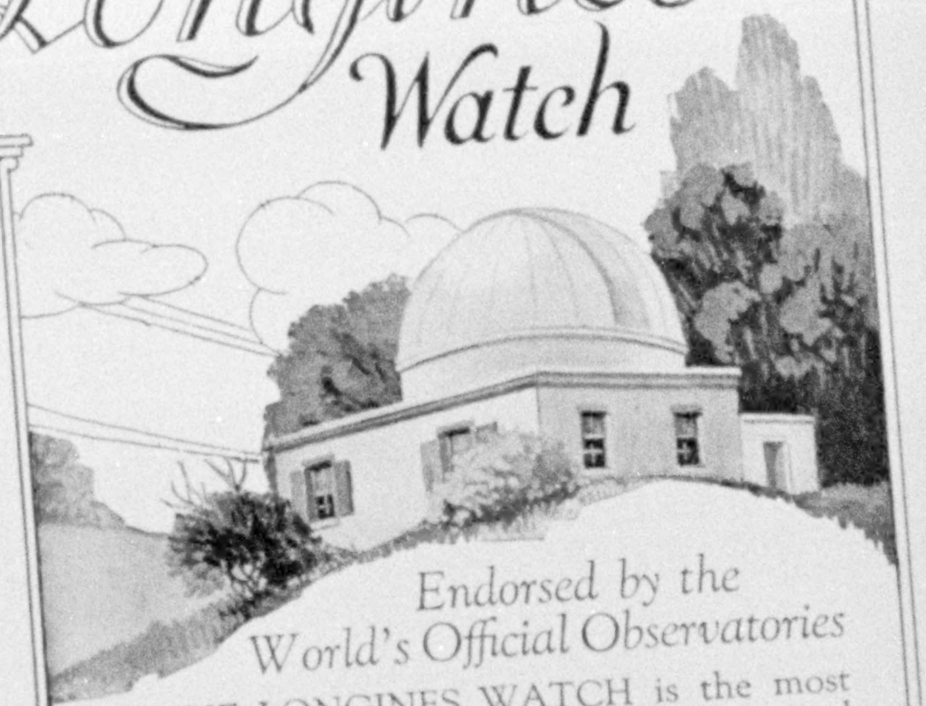
The Longines Watch



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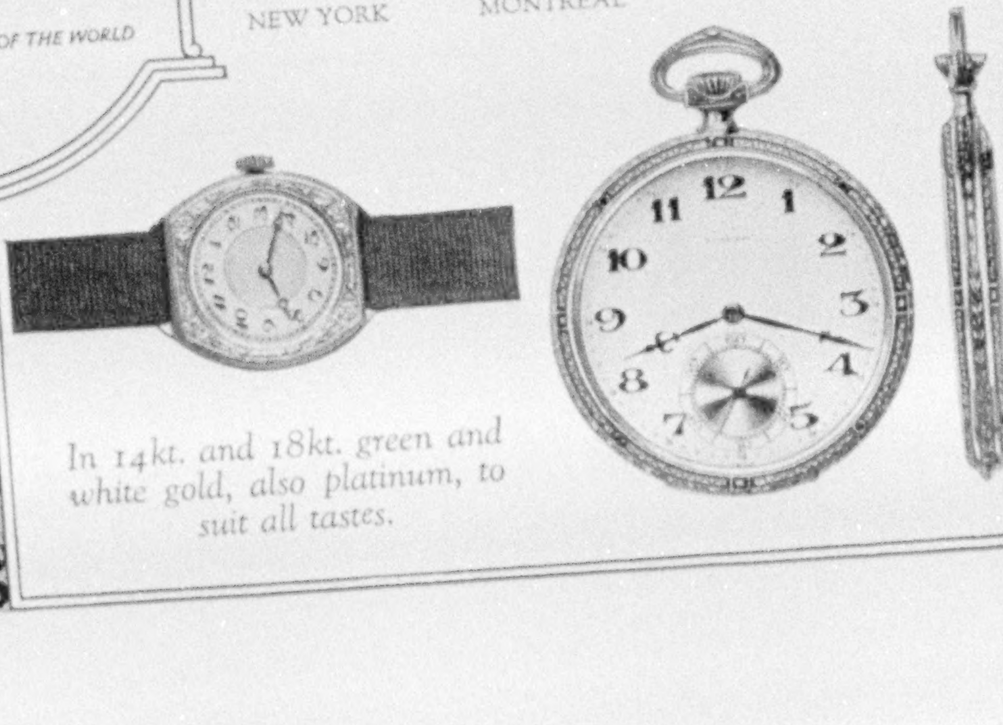

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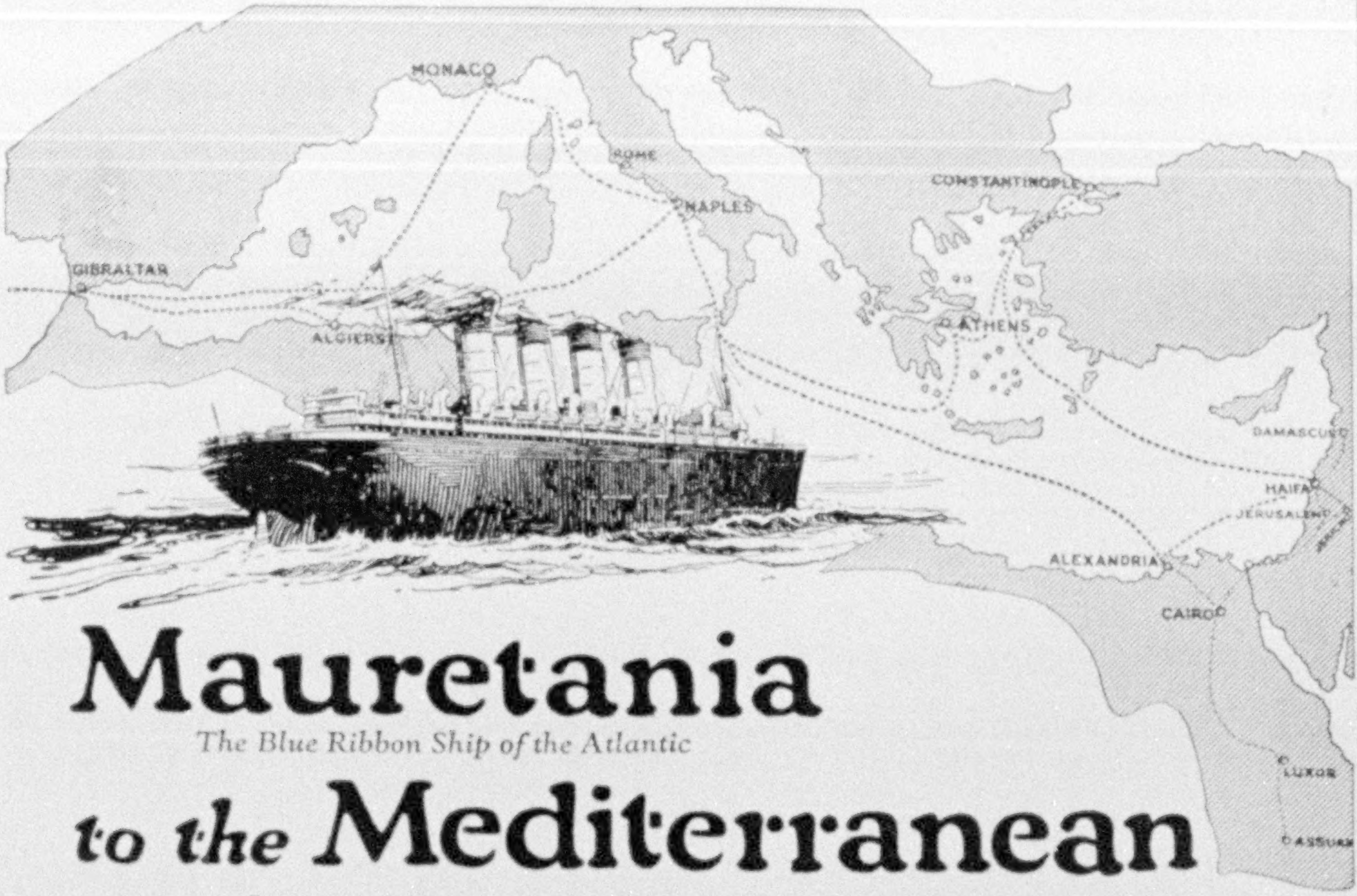

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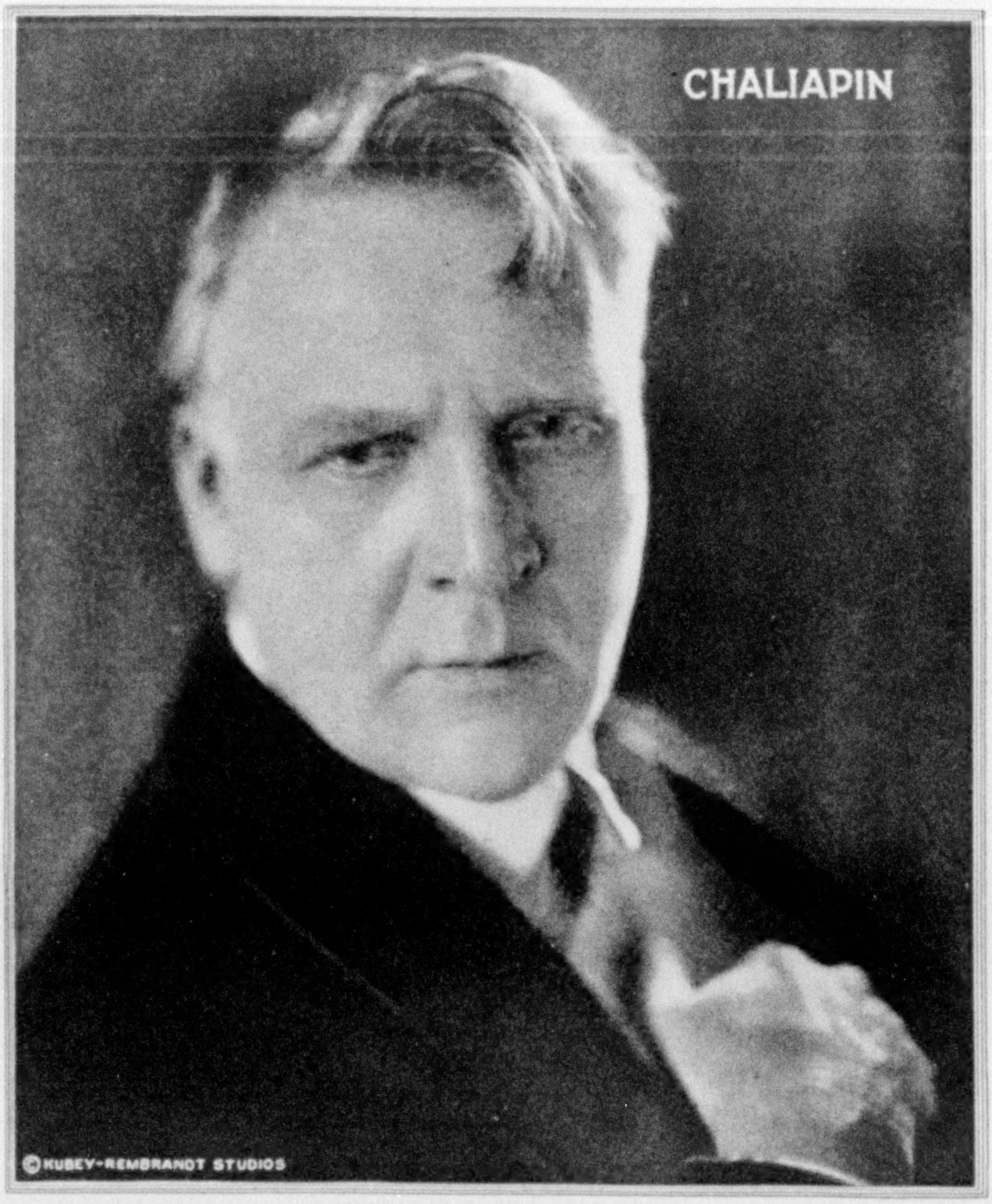

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A LONGITUDINAL JOURNEY THROUGH CHILE

By Harriet Chalmers Adams

Author of "Picturesque Paramaribo," "Kaleidoscopic La Paz," "The First Transandine Railroad from Buenos Aires to Valparaiso," "Cuzco, America's Ancient Mecca," "Rio de Janeiro, in the Land of Lure," in the National Geographic Magazine

OUR friends in Antofagasta, on the arid coast of northern Chile, urged us to continue the journey south by sea.

"So much easier than the long, dusty railroad trip," they said.

But some years before we had made the voyage, visiting the ports of this elongated country, whose amazingly diversified shore, extending through nearly thirty-nine degrees of latitude, is exceeded in length only by Canada and Brazil.

This time we decided to travel on the longitudinal railway, from its beginning, in the dreary desert, to its dropping-off place, on the wooded shore of the Gulf of Ancud. Few, save the Chileans themselves, make this comprehensive journey, from the rainless region of the north to the rich agricultural heart of the country, and on through the magnificent forest and river lands, long held by the valiant Araucanian Indians, to that enchanting mountain and lake region unrivaled in beauty the world over.

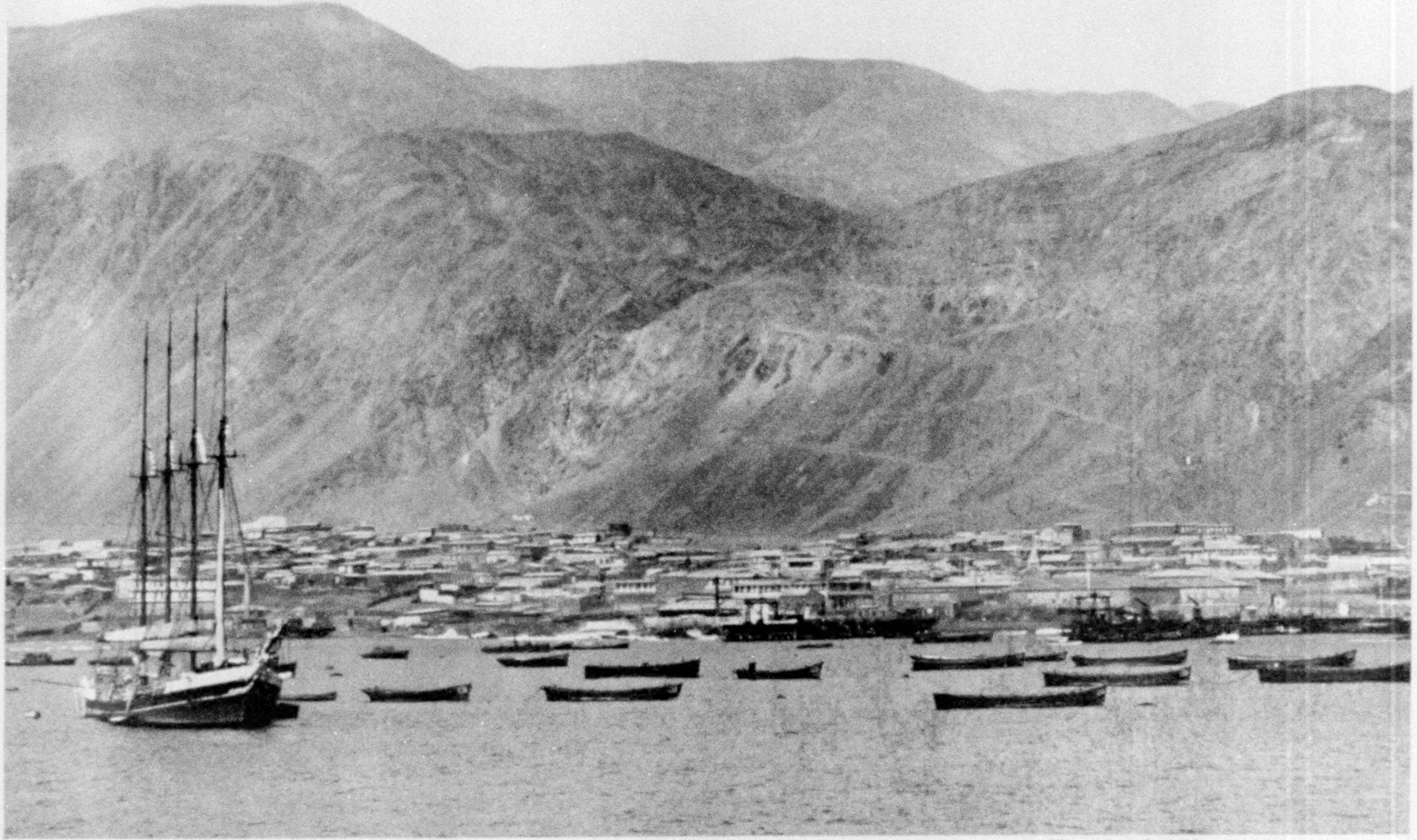
Still farther south, reached by coasting vessel, lies the wild territory of Chiloé, with its curiously denticulated coast and forest-fringed fjords; forbidding Magallanes, a network of channels and archipelagoes, with majestic glaciers slipping into a leaden sea; and little-known Tierra del Fuego, whose unique pasture lands support two million heavily fleeced sheep, supplanting the dappled guanaco on the southernmost range of the world.

Chile, the only South American country lying altogether west of the Andes, is 2,627 miles long. Placed east to west across the United States, its sword-like body, varying in width from 105 to 223 miles, would stretch from the Singer Building, in New York, to the City Hall, in San Francisco, and extend over 50 miles into the Pacific Ocean.

Geographically it is much like our Pacific coast reversed. Alaskan fjords are paralleled in the Magallanes country. Where we have northern forests in the State of Washington, Chile is arid; where we have southern deserts on the Mexican border, Chile is forested.

The long agricultural valley of Chile, alternating between grainfields and vineyards, corresponds with the "Sunny San Joaquin," in California, where I was born; and the climate of the more densely inhabited portions of this southern republic is not unlike the sparkling, sun-drenched atmosphere of our own Golden West.

Our Antofagasta friends have a garden in the desert. My bedroom window, high up in the tower, commanded a view of the town. Walls and roofs as colorless as the sand were unrelieved by a tree or a blade of grass; yet, just under my window, the barren soil had been touched by the magic



Photograph from Harriet Chalmers Adams

TOCOPILLA, A NITRATE PORT IN THE NORTHERN DESERT OF CHILE

The coast range of the Andes in this region rises abruptly from the sea, with an occasional narrow strip of land on which a town is set. Water is brought a great distance by pipe-line from the river Loa.

wand of irrigation. Here firs and eucalyptus towered above bamboos and oleanders, and pomegranate and fig trees were heavy with fruit. In the shade of the grape arbor the breakfast table was laid.

Water is brought 250 miles by pipe-line from the Bolivian Andes. One night the Chinese gardener left the faucet open, and by morning forty dollars' worth of the precious fluid had been consumed by the thirsty sand.

MOUNTAIN PEAKS USED FOR SUN DIALS

Irrigation in these lateral coastal valleys, lying between the Andes and the Pacific Ocean, dates back to pre-Spanish days. Then, as now, agriculture was dependent on the streams flowing seaward from the Andes. We learned from the American consul at Tacna, in the province still in dispute between Peru and Chile, of the following ancient method still in vogue:

In some of these irrigated districts sunset is the time fixed for transferring the water from one section to another; but in the valley, several hundred feet below the inclosing hills, the instant of sunset occurs earlier at the western rim than in the other end of the valley. After the sun has set in the lowlands it continues for some time to illuminate the snowy slopes above, which glow with ruby light, then suddenly turn milky white and fade into darkness.

To avoid controversy, the ancient Peruvians brought common sense to bear and agreed to consider it sunset at that moment when the sun ceased to illuminate the snow-clad mountain peaks. This method, known as "calculating the sky view," is still in vogue in the province of Tacna.

In Antofagasta we boarded the eastbound train on its way to the Bolivian highlands, changing to the Chilean longitudinal sixty miles inland on the pampa. The longitudinal's beginning is at Pisagua, a port north of Antofagasta. Arica, still farther north in disputed territory, is not yet connected with the Chilean railroad system, being beyond the nitrate zone.

Uninterrupted rail communication from north to south was finally completed eight years ago. In the 1,863 miles of track from Pisagua to Puerto Montt, on the Gulf of Ancud, three different gauges are employed. The government owns most of the road and is gradually taking over the northern section, with its many feeders, controlled by British and Belgian capital and originally built in isolated regions to bring nitrate and other minerals to the coast.

It takes a drab pencil to draw for you a picture of the country crossed those first two days out from Antofagasta. I looked in vain on the monotonous, treeless plain for so much as a cactus plant. We were too far inland to glimpse the restless, blue Pacific, whose tempestuous surf enlivens even the most colorless of the desert ports, while to the east bleak gray hills shut off the snow-crowned Andes.

This stupendous range, whose jagged peaks soar skyward, has created the barren waste by wringing all the moisture out of the trade-winds from the east. Before the Andes rose to their present height, this desert, nearly twice the length of Syria, was a tropical forest.

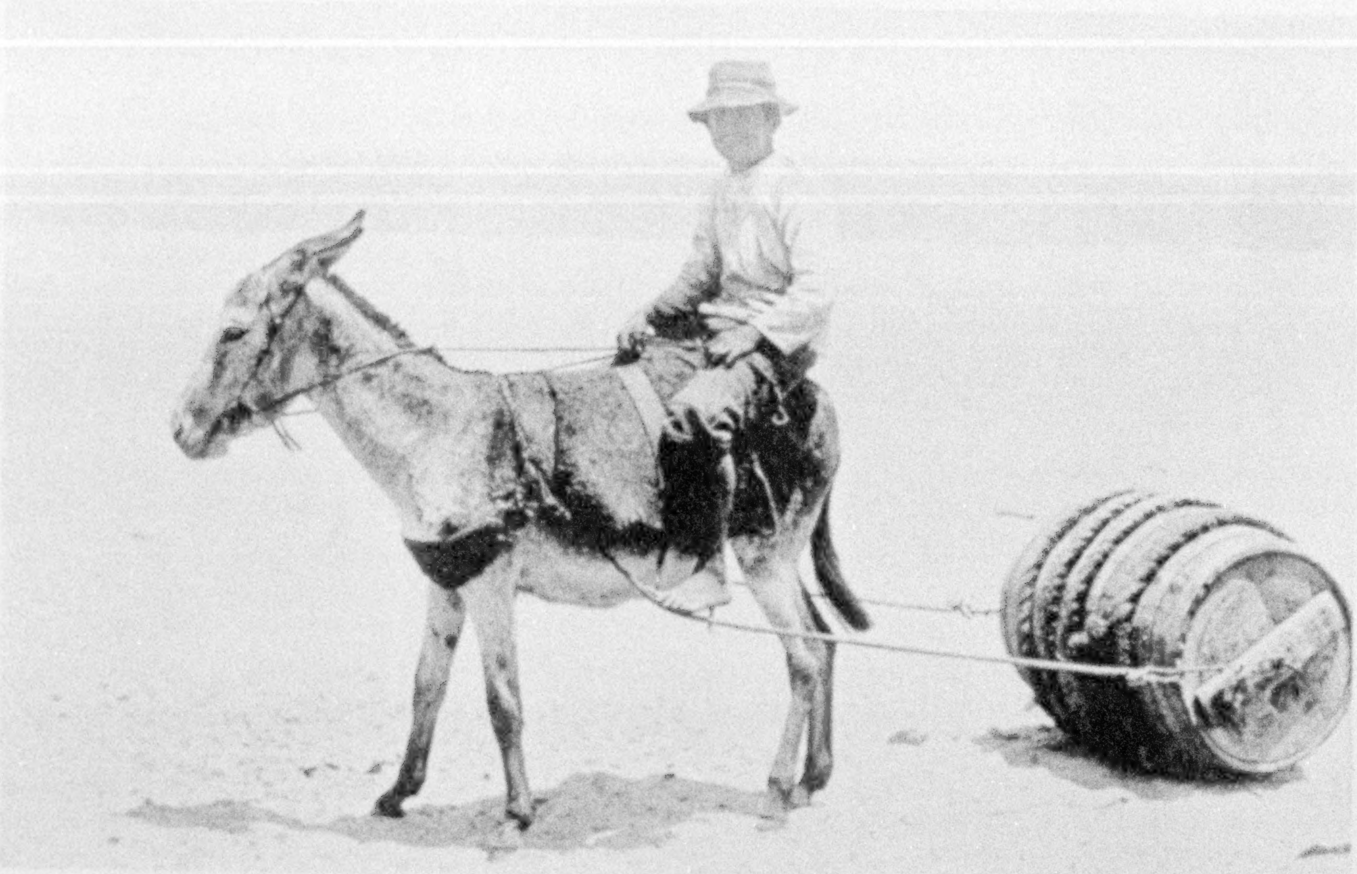
Just to the north, in Tarapacá, numerous skeletons of gigantic ant-eaters, denizens of the jungle, have been found embedded in the sides of ravines. Chile was an altogether different country when the Andes were young.

CHILE'S CHIEF SOURCE OF REVENUE

Near the railroad I saw deeply furrowed patches of white earth resembling old salt deposits. These mark the site of former nitrate workings. Nitrate of soda, Chile's chief source of revenue, of which the country has virtually a world monopoly, is obtained from the rough rock known locally as *caliche*. It is dug or blasted from the earth, in some places lying near the surface; in others 20 to 30 feet below ground. The nitrate deposits lie from 15 to 90 miles inland from the coast, at an altitude varying from a little over 3,000 to 13,000 feet.

Scientists disagree as to the origin of this valuable mineral. Some claim (and Darwin among them) that it had its origin in seaweed of an ancient period.

One savant argues that the deposit resulted from nitrogen contained in guano. Others believe in its atmospheric origin, advancing the theory that in a remote age



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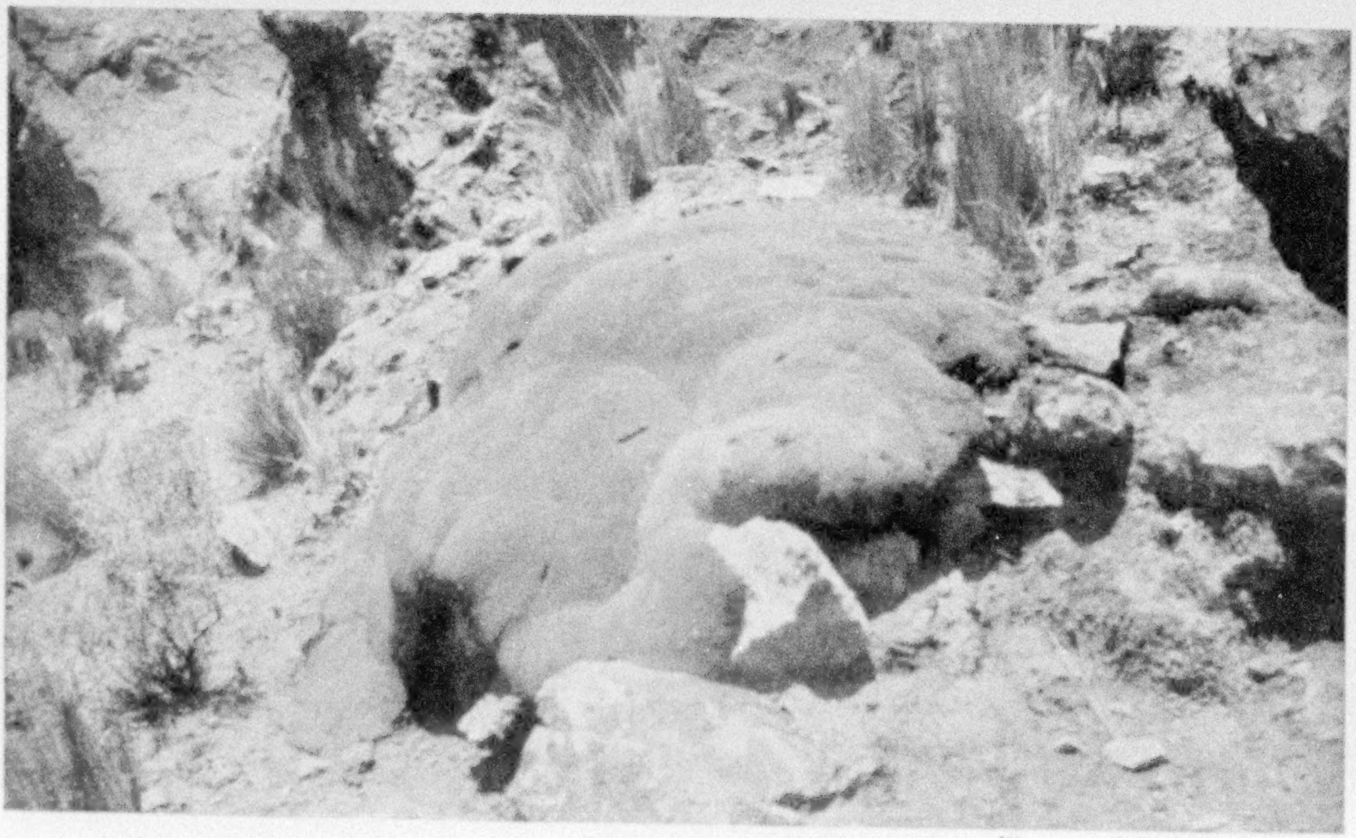
HAULING WATER IN THE DESERT

This wagon rolls across the northern Chile desert from the distant river. In the Province of Tacna, the territory in dispute between Peru and Chile, a few traverse rivers flow down from the Andes to the sea; then a great stretch of waterless country until the oasis of Copiapó is reached.



Photograph by I. F. Scheeler

YARETA, A CURIOUS PLANT OF THE ANDEAN DESERT

This member of the celery family (*Azarella yareta*) grows in a dry, rocky country, at an altitude of about 15,000 feet. It is green in color, highly resinous, makes an excellent fuel, burns like peat, with little flame and much smoke; gives a fair amount of heat, produces much ash, and throws out flames of many hues. In appearance the plant is altogether unlike its relatives, the celery and the parsnip.

electricity passing through moist air, by combination, formed nitric acid; this in turn, impregnating the flood waters of Andean streams and coming in contact with the limestone of the rocks, formed nitrate of lime; another step in Nature's laboratory brought this nitrate of lime in contact with sulphate of soda, forming the *caliche* we find to-day.

The nitrate fields stretch for several hundred miles along the pampas' western rim, which marks the edge of the ancient flood waters.

THE NITRATE PROCESS IS SIMPLE

The process of production is simple. The loose rock is carried by mule teams, or cars suspended to cables, to the little railways which circulate through the nitrate establishments, and on to the crushing plant, where, after being broken into small pieces, it is thrown into iron vats and boiled until the dissolved saltpeter can be filtered.

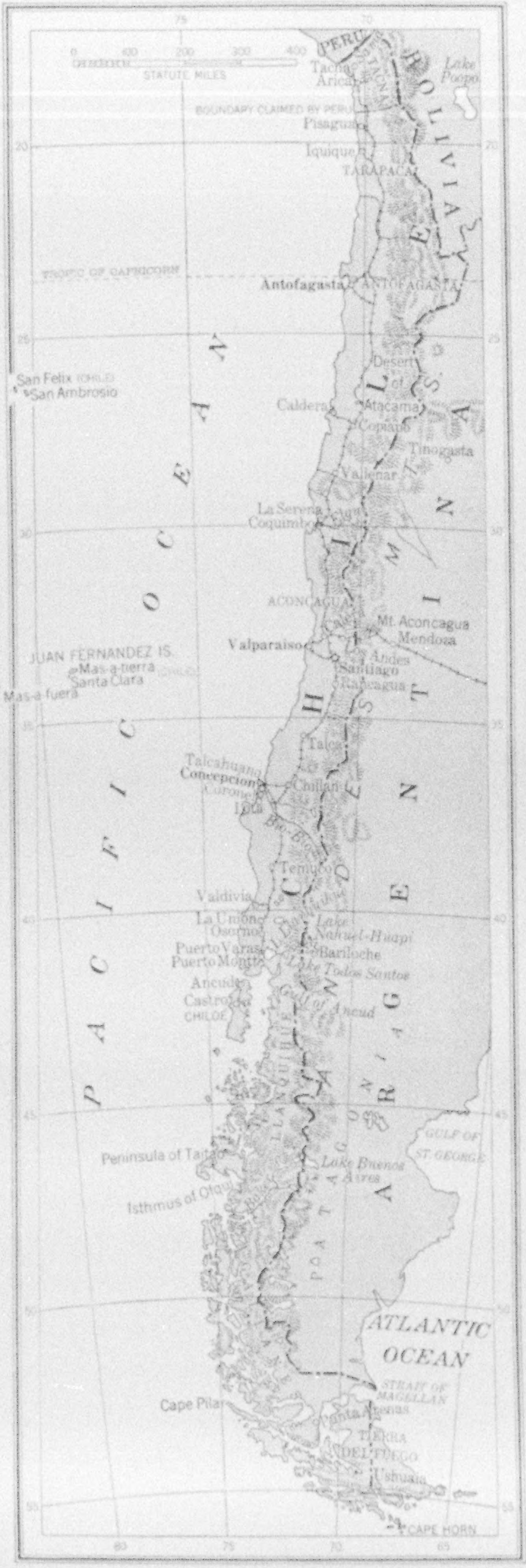
When crystallized it is cleaned, and the finished *salitre*, or nitrate of soda, packed in bags and sent to the nearest port. The greater portion now comes to the United States to enrich our soil and to be used in the manufacture of explosives.

Iodine, precipitated from the nitrate solution, is the most important by-product of the *caliche* rock. By agreement among the nitrate establishments, its production is limited to every sixth year, that the market may not be overstocked.

Operated for the most part by Chilean and British capital, 129 of these nitrate establishments, or *oficinas*, as they are known locally, are scattered over the pampa back of Pisagua, Iquique, and Antofagasta, their tall chimneys dominating the plain. At night, from our southbound train, the myriad twinkling lights of these strange desert towns spoke of life and industry in a region altogether dependent for sustenance on the world of trees and pastures beyond the far horizon.

A LONG JOURNEY "JUST TO SEE RAIN"

At a dreary, sun-baked station, where one ugly galvanized-iron building broke the monotony of the plain, the khaki-clad British manager of one of the nitrate establishments boarded our train. He was going south, he said, "just to see it rain."



STATUTE MILES
PERU
Tacna
Arica
BOLIVIA
Lake Poopo
BOUNDARY CLAIMED BY PERU
Pisagua
Iquique
TARAPACA
TROPIC OF CAPRICORN
Antofagasta
ANTOFAGASTA
San Felix (CHILE)
San Ambrosio
Desert of Atacama
Caldera
Copiapo
Tinogasta
Vallenar
La Serena
Coquimbo
ACONCAGUA
Mt. Aconcagua
Mendoza
Valparaiso
Andes
Santiago
Rancagua
JUAN FERNANDEZ IS.
Mas-a-tierra
Santa Clara
(CHILE)
Mas-a-fuera
Talca
Talcahuano
Concepcion
Coronel
Chillan
Temuco
Valdivia
La Union
Osorno
Lake Nahuel-Huapi
Bariloche
Puerto Varas
Puerto Montt
Lake Todos Santos
Ancud
Castro
CHILOE
Gulf of Ancud
PACIFIC OCEAN
CHILE
ANDES MTS.
ARGENTINA
PATAGONIA
GULF OF ST. GEORGE
Peninsula of Taitao
Lake Buenos Aires
Isthmus of Ofqui
ATLANTIC OCEAN
STRAIT OF MAGELLAN
Cape Pilar
Punta Arenas
TIERRA DEL FUEGO
Ushuaia
CAPE HORN

Drawn by James M. Darley

A SKETCH MAP OF CHILE

Photograph by R. W. Lohman

THE LITTLE COUSIN OF THE CAMEL

In the Andean region of northernmost Chile, as in the neighboring countries of Peru and Bolivia, llamas are used as beasts of burden. They are highland animals and do not come down to the coast. The trail call of the Indian driver is "Buss-ss-ss."

The eternal blue skies had gotten on his nerves.

"The climate is trying," he told me, "hot during the day, with afternoon duststorms, and often frost at night."

His particular settlement, with 2,000 or more inhabitants, is a little world in itself, miles from its nearest neighbor. Surrounding the plant are comfortable homes, a hotel, store, hospital, church, post-office, barracks, and a plaza, where the band plays in the evening.

According to authorities, the explored nitrate region contains sufficient mineral to last for 240 years, at the present rate of production.

The nitrate laborers are mostly Chileans, the *rotos*, or workingmen of the country, with a few Bolivians and Peruvians. Chile has always depended for labor on her own peasantry, never importing African slaves or Asiatic coolies, as have other of the Latin American countries.

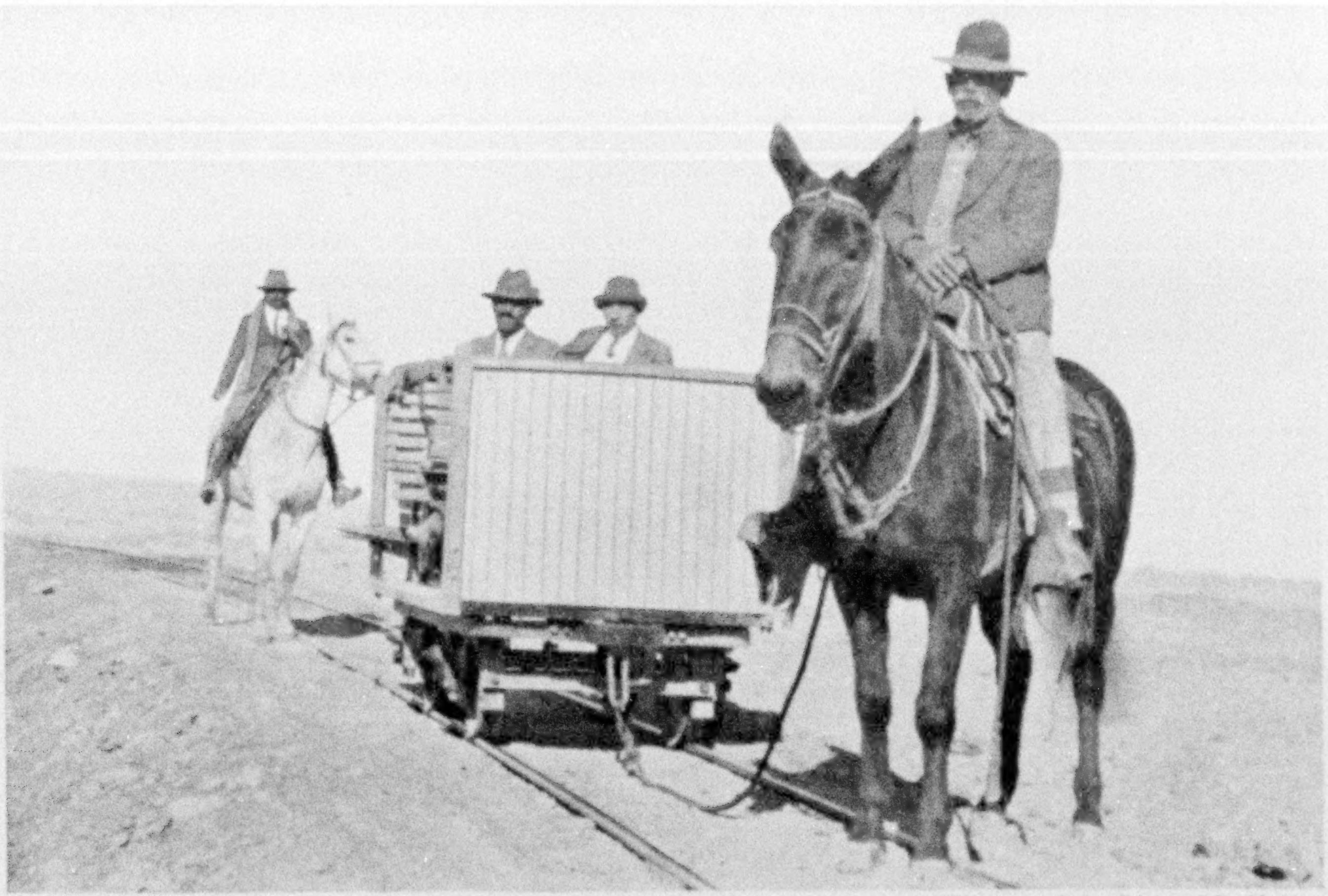
Alcoholism is slowly but surely sapping the vitality of the Chilean *roto*, long noted for his powerful physique. The Latin American of the educated class drinks temperately, regarding wine as a nourishment rather than a stimulant; but, on my last journey, I noted a growing movement in favor of prohibition throughout Chile, among thinking people who realize the evil result of alcohol on the working classes.

The second night out from Antofagasta we reached Copiapó, where we left the Valparaiso Express to travel thereafter on "local" day trains, stopping off in many Chilean towns all the way down to the Gulf of Ancud.

CHILE'S MOST HISTORIC TOWN

Copiapó is Chile's most historic town. The little stream which borders it, now nearly dry, now in full flood, was our first oasis after crossing the parched desert of Atacama. To travelers of old, as to us, this strip of meadow land was a God-given sight.

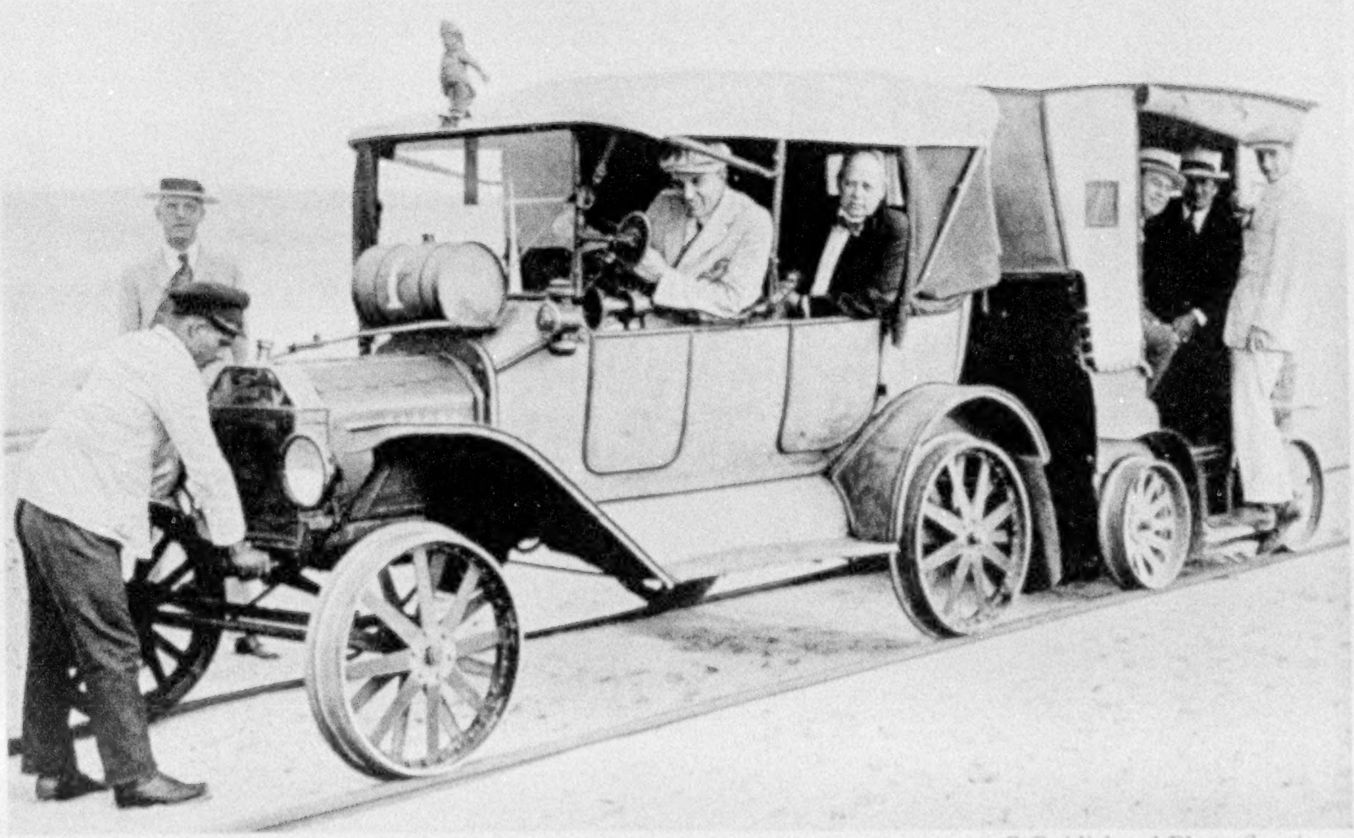
To Copiapó, in the fifteenth century, marched the Incan ruler, Tupac Yupan-



Photograph by Richard B. Holt

NITRATE FIELD ENGINEERS ON A TOUR OF INSPECTION

These fields of northern Chile stretch for several hundred miles along the pampas' western rim. Operated for the most part by Chilean and British capital, 129 of these nitrate establishments, or *oficinas*, as they are known locally, are scattered over the pampa back of Pisagua, Iquique, and Antofagasta. The engineers of one of these establishments are making their rounds in a mule-drawn car furnished with a brake and two good seats, but no springs.



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A DESERT TRAIN WITH IRON WHEELS SUPPLANTING RUBBER TIRES

The Chilean longitudinal railroad does not extend north of Pisagua, but many of the nitrate establishments have their local railways. The American automobile is here supplanting the old mule-team.

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BALES OF JUTE BAGS FROM INDIA FOR THE NITRATE FIELDS

The northern ports of Iquique and Antofagasta are open roadsteads, ships anchoring well offshore.

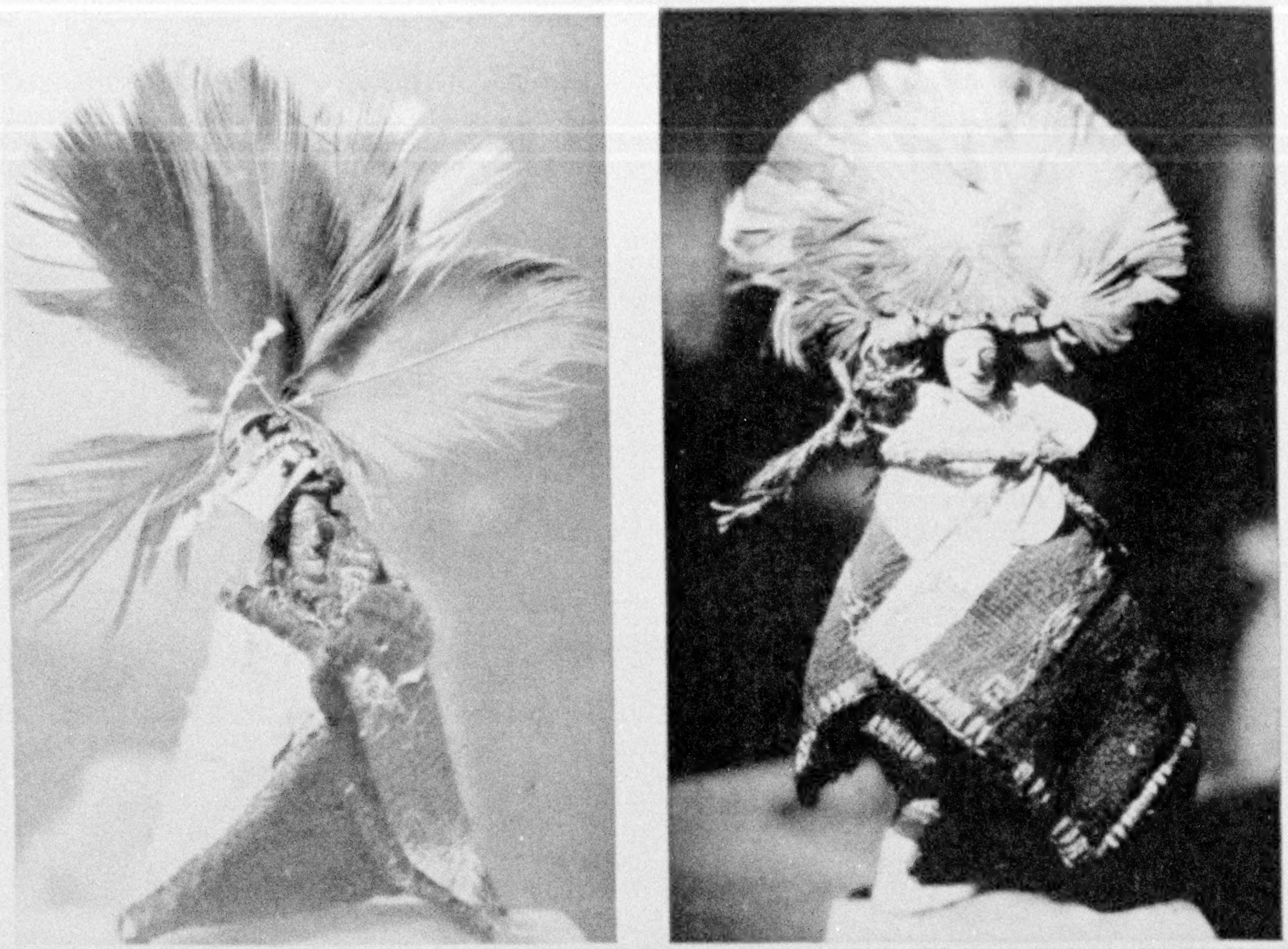
qui, with his victorious army, to subjugate the tribes of northern Chile.

The Inca's trail from Peru led down the backbone of the snow-clad Andes and across the burning desert. In 1535 Diego de Almagro, a colleague of Pizarro, traveled the same road with a great army of Spaniards and Peruvians, horses and llamas, two Incan princes acting as guides.

Old Spanish chronicles tell of the terrible suffering from cold and thirst endured by Almagro's men on the six months' march. The desert was strewn with their bones. Alluring were Copiapó's meadows to those who survived!

Almagro failed to subdue the southern natives, and five years later a Spanish army was again encamped in Copiapó, led this time by Pedro de Valdivia, who kept on south to found Santiago.

In the halcyon days of '49, when California's gold lured men round the Horn, Valparaiso became the great mart of the Pacific coast, supplying flour and other commodities to the California miners. My pioneer grandfather used to tell me



Photographs by Arthur Madge

IMAGES OF PREHISTORIC DAYS FOUND IN CHILE

The stone figure at the left was unearthed in an underground habitation south of Calama, on the old Incan highway between Cuzco and Copiapó. The costume, splendidly preserved, gives us the dress of a remote period, probably antedating Incan rule. The image at the right is of silver, and was found by a chinchilla hunter on the pampa of northern Chile, not far from the Bolivian frontier. It is three inches in height and represents a woman of the ruling class. The colors of the feather-work and the vicuña wool garments are well preserved.

of those eventful days. When he was in Chile in the early fifties, Copiapó was an important town, sharing the European opera season with Santiago and Valparaiso. Grandfather knew William Wheelwright, the American captain of industry, who in 1851 built the first railroad in South America from the port of Caldera, 50 miles inland to Copiapó.

Wheelwright's dream was of a transcontinental railway across the Andes to Tinogasta, in Argentina, and on to the Atlantic; but the road never got far beyond Copiapó.

THE ROMANTIC STORY OF GODOY, THE SILVER KING

This great American also gave Chile its telegraphic system and, after failing to interest American capital in a steamship line between Valparaiso and New York, turned to England and inaugurated in the early sixties the first steamer service between the west coast and Europe.

In 1832 a donkey driver, Juan Godoy, discovered a silver deposit near Copiapó and put the long-neglected town on the map.

Godoy's story reads like a romance. Tired of loading his train of donkeys with scanty brushwood for town customers, he started across the pampa to hunt the roving guanaco. Sitting on a rock to rest, he discovered that his seat was of silver. Returning home with specimens, he shared the knowledge of his discovery with an educated acquaintance, who aided the ignorant man to make the most of his find. Godoy became the Silver King of that period.

It was hard for us to visualize Copiapó's past splendor in the forlorn little town that we found. Half the buildings were still in ruins, after the disastrous earth-

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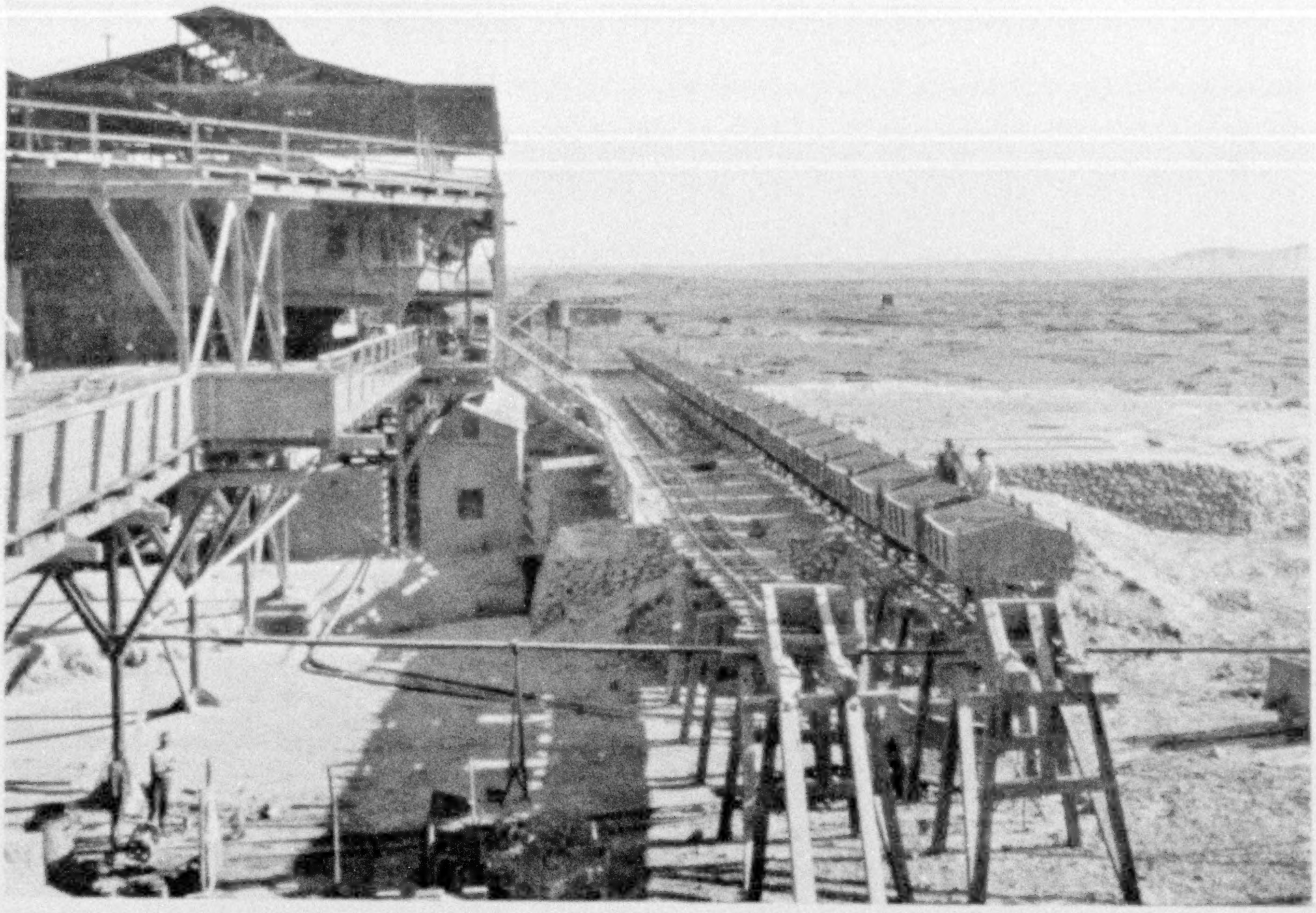
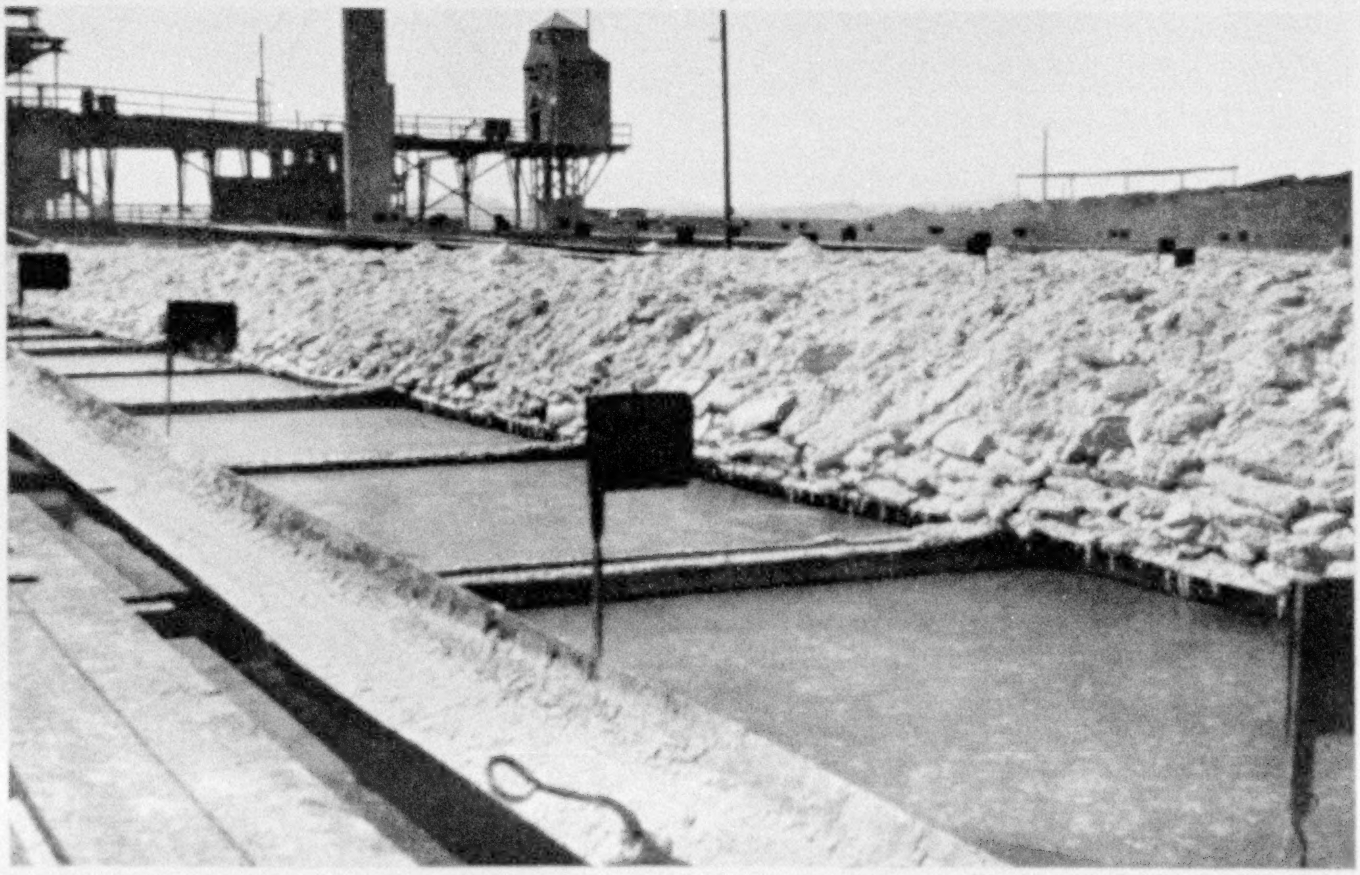


A NITRATE PLANT OF NORTHERN CHILE

At the side of the plant are big hoppers into which *caliche*, the crude nitrate rock from the pampa, is unloaded. From the hoppers the rock is fed into the crushers, and, after being broken into small pieces, is thrown into iron vats and boiled until the saltpeter can be filtered.



Photographs by Richard B. Hoit

CRYSTALLIZATION VATS, NITRATE PLANT

The hot brine, brought down from the boiling-tanks through the trough in the foreground, is cooled and crystallized in these vats. The nitrate, dug out of the vats a few hours ago, is now draining on the ledge. Most of Chile's nitrate comes to the United States to be used as fertilizer.

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IODINE, A BY-PRODUCT OF NITRATE MANUFACTURE

Precipitated from the nitrate solution, iodine is the most important by-product of the *caliche* rock. By agreement among the nitrate establishments, its production is limited to every sixth year, in order that the market may not be overstocked. These rawhide kegs, filled with iodine, are worth $300 each.

quake of the previous year. The hotel, kept by a sad-faced Englishman, had a decided tilt. Doors and windows were jammed and window-panes missing. Our host apologized for candle-light, saying that the gas-pipes were still out of commission. The stone bathtub, reached by a rickety flight of steps, had a somewhat tipsy appearance.

But the Copiapinos have not lost courage. More than once earthquakes have completely demolished the town. In this land where the extreme infrequence of showers is a hardship, they have come to believe that earthquakes are forerunners of much-needed rain. Between quakes they look to the east, watching for a heavy fall of snow in the Andes. Then the river runs full and the fields smile.

From Copiapó a trail across the desert leads to the mountains, so sterile, gaunt, and forbidding; yet there is a majesty in the Andean contour. From our bleak, upland camp at the sunset hour, the coloring of slopes and crags was gorgeous beyond adjectives to describe. Pink deepened to rose; rose to terra-cotta; terra-cotta to purple. Then each towering peak became a sentinel guarding a mysterious Promised Land beyond the Andes.

We passed the ruins of long-abandoned stone dwellings, occupied, perhaps, in those remote days of pre-Incan rule when these mountains had not risen to their present height and this region was within the corn belt.

HOME OF THE GUANACO, VICUÑA, AND CHINCHILLA

We geographers must think of the Andes, not as a range rising from the coastal plain, but as the most stupendous mountain system in the world, if we con-

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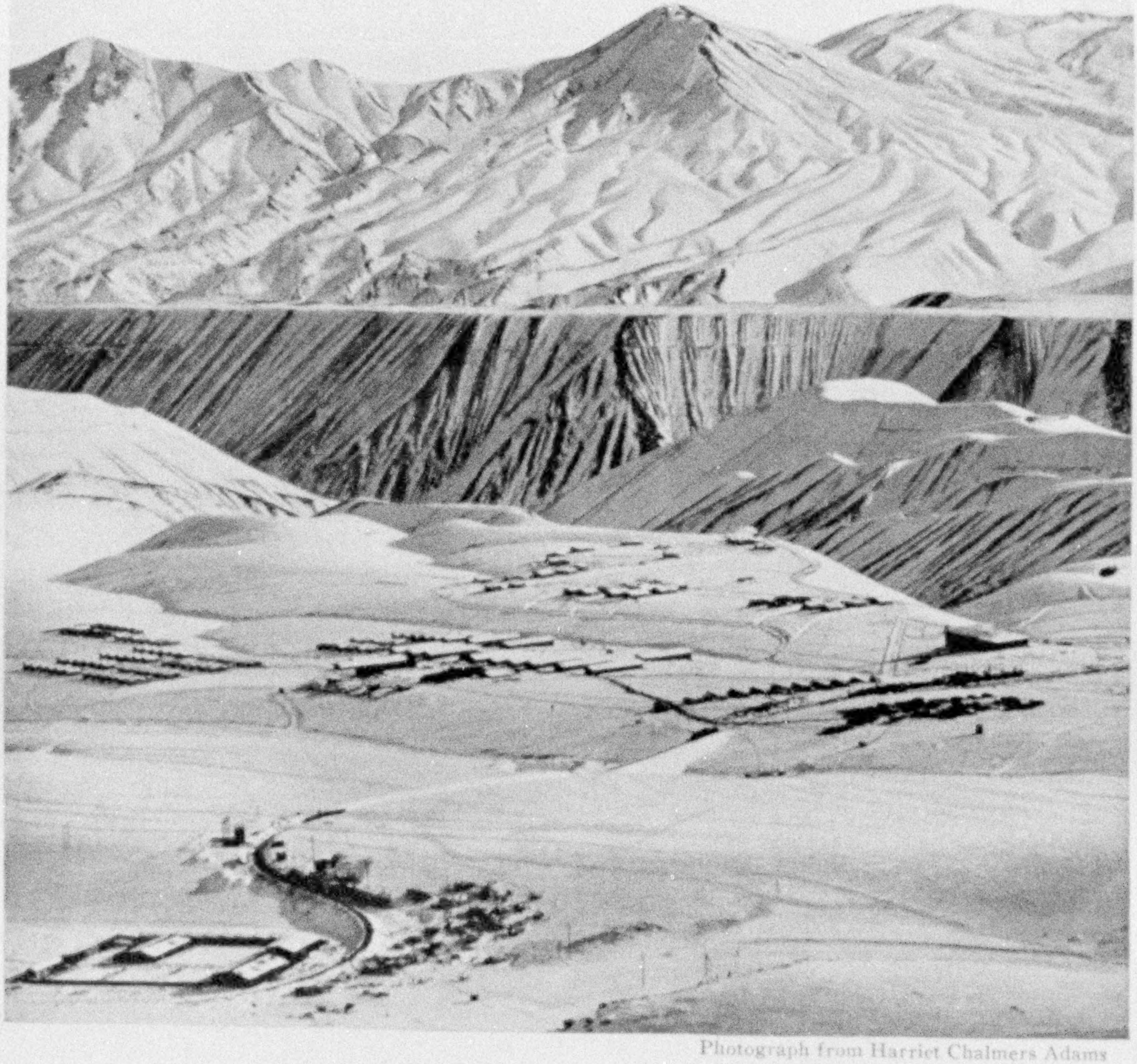


Photograph from Harriet Chalmers Adams

AN AMERICAN COPPER MINE IN THE CHILEAN ANDES

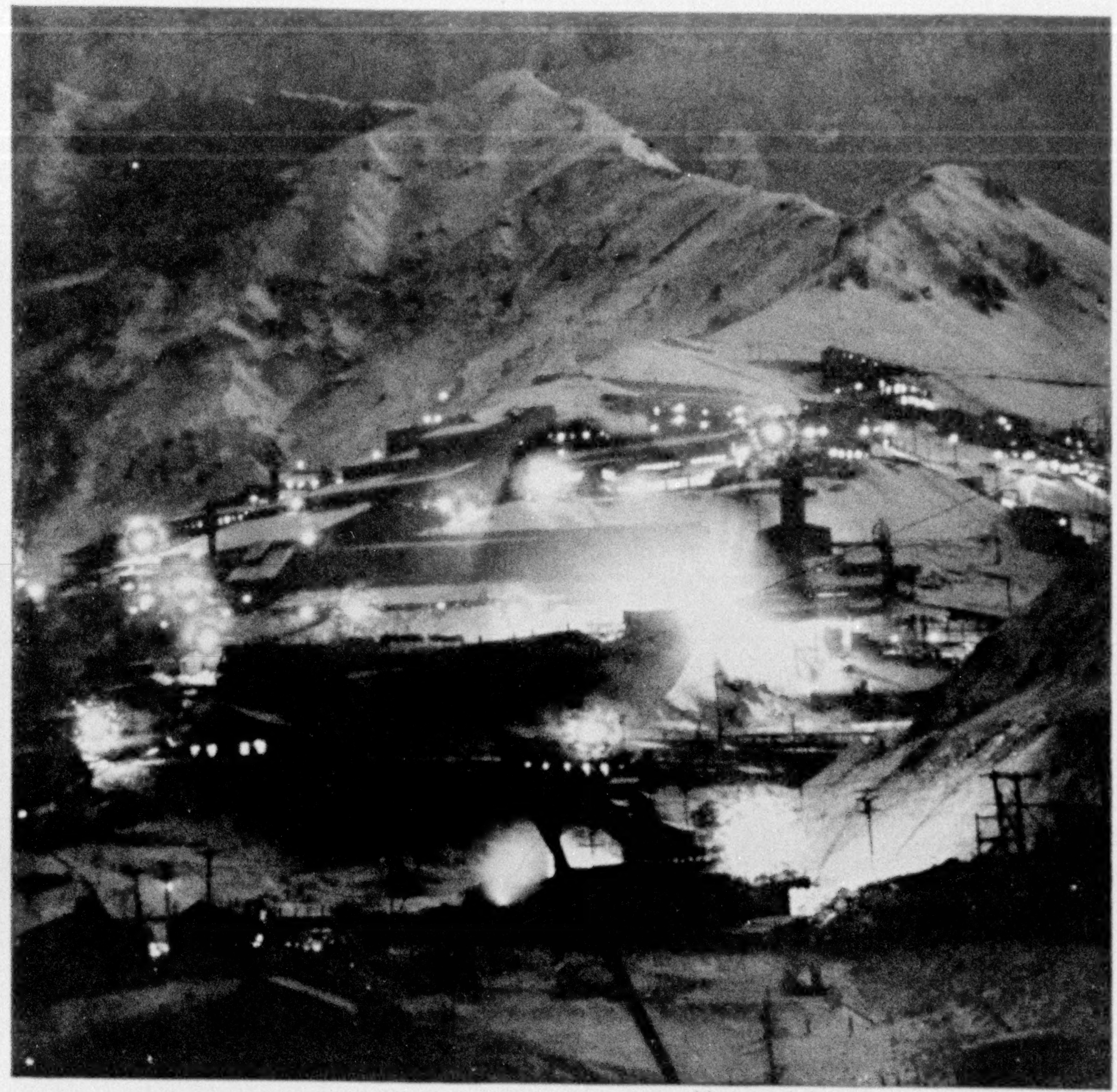
If poverty-stricken in verdure, northern Chile is superlatively rich in minerals. Here two rival American mining companies operate gigantic copper properties. A railroad from a port on the Pacific ascends the mountains by way of this canyon, 3,000 feet deep, to the American mine.

sider its gradual slope from ocean bed to crowning summit. Young, as compared with other great ranges, it is still the giant among them.

These heights are the home of the roving guanaco and vicuña, wild cousins of the llama and alpaca, all of cameloid stock. Here soars the mighty condor. A little to the north lies a highland plateau known as the Pampa of the Ostrich, where an occasional rhea, once so abundant on the Argentine plains, still roams.

One afternoon we rode past a natural rock fortress with innumerable windows. At each opening squatted a wise little gray viscacha, gazing out over the plain. A southern naturalist told me of the remarkable habits of these strange rodents.

"In Argentina," he said, "the farmers endeavor to destroy whole colonies of viscachas by filling in the openings to



Photograph from Harriet Chalmers Adams

AN AMERICAN COPPER MINE OF CENTRAL CHILE

It lies high up in the mountains, in the crater of an extinct volcano. In the winter the buildings are deep in snow. By night the flare of electric lights gives a most fantastic appearance to the isolated camp.

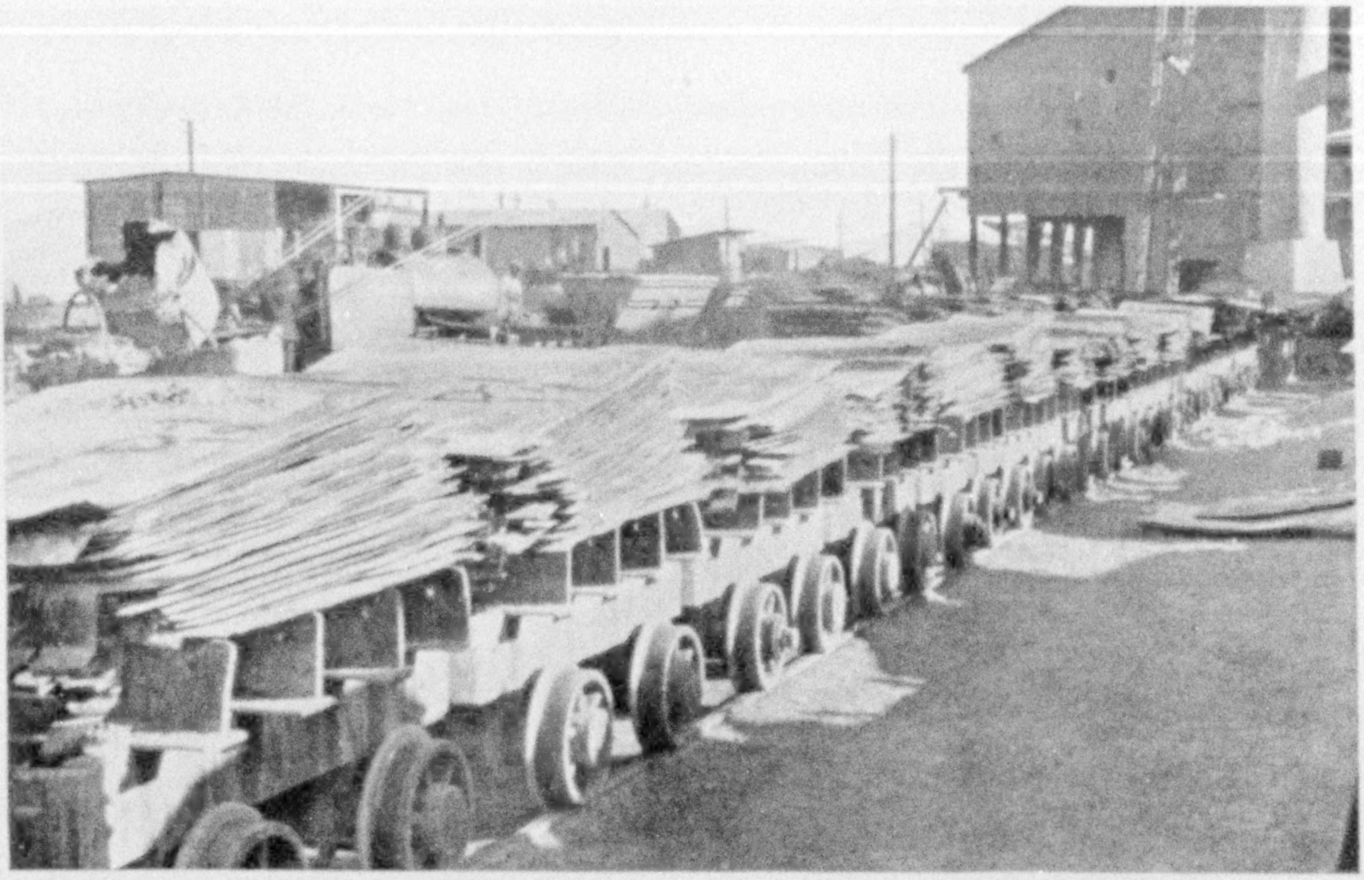
their burrows. The task completed, the men ride off, satisfied that the crops in this particular section will no longer be undermined. A mile or more away another viscacha colony receives, in some mysterious manner, an S. O. S. signal, and off the animals scamper to dig out their unfortunate neighbors."

The fleet pampa fox and the velvety chinchilla dispute the borderland between plateau and plain. Near the railroad we passed a chinchilla farm, a new and profitable industry. The area was inclosed by a huge galvanized-iron fence sunk deep in the ground that the valuable animals might not burrow out.

Cattle are driven from Argentina into Chile over the mountain passes, making the journey with their front hoofs shod. Throughout the length of Chile there are many of these Andean passes used by the natives from time immemorial. Through one of these natural defiles a railroad, now building west from Salta, in northwest Argentina, will eventually enter the Chilean nitrate desert, bringing vegetables and fruits now imported from the valleys of the south.

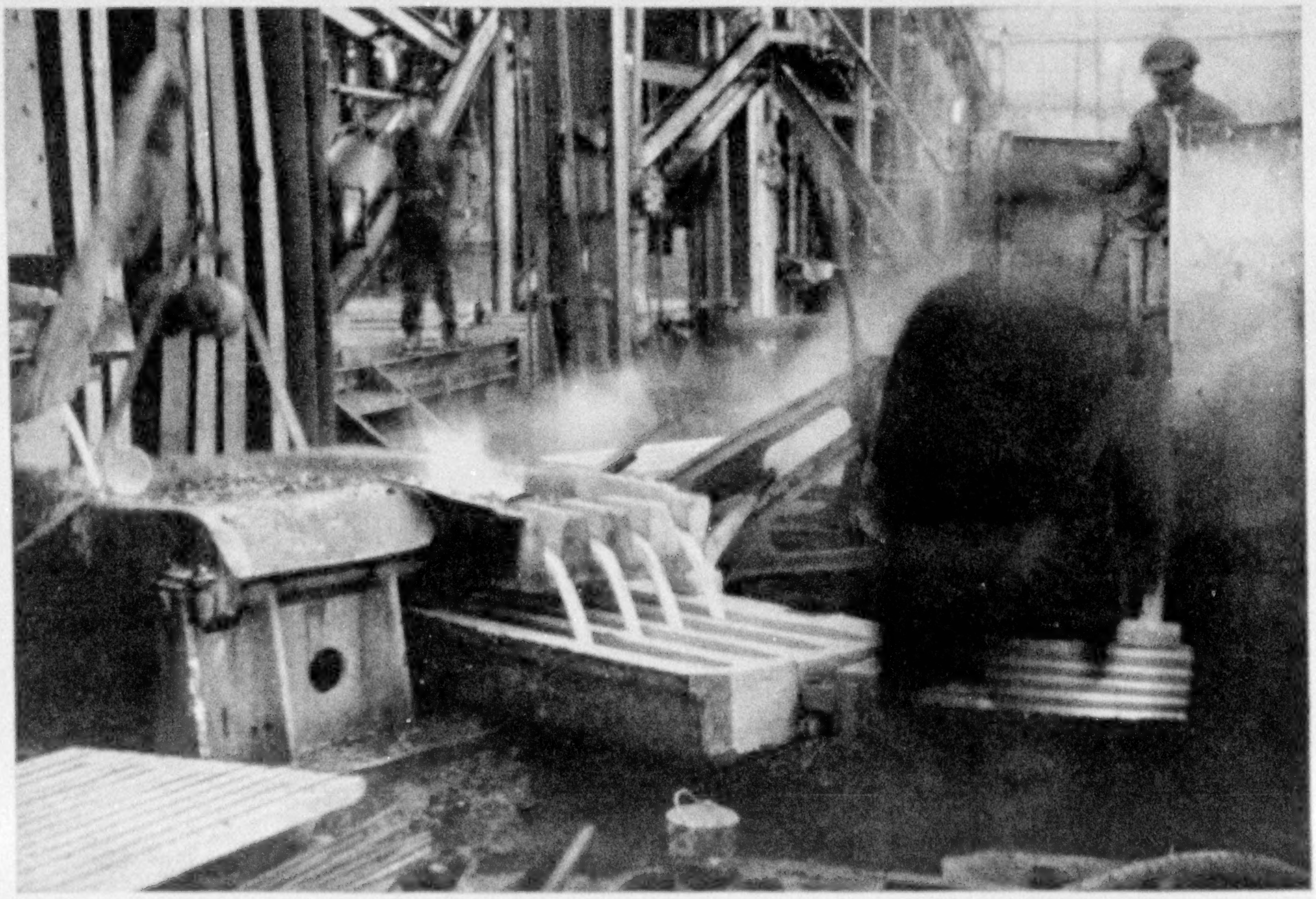
LAND SUPERLATIVELY RICH IN MINERALS

If poverty-stricken in verdure, this region is superlatively rich in minerals.



SHEETS OF COPPER READY FOR MELTING

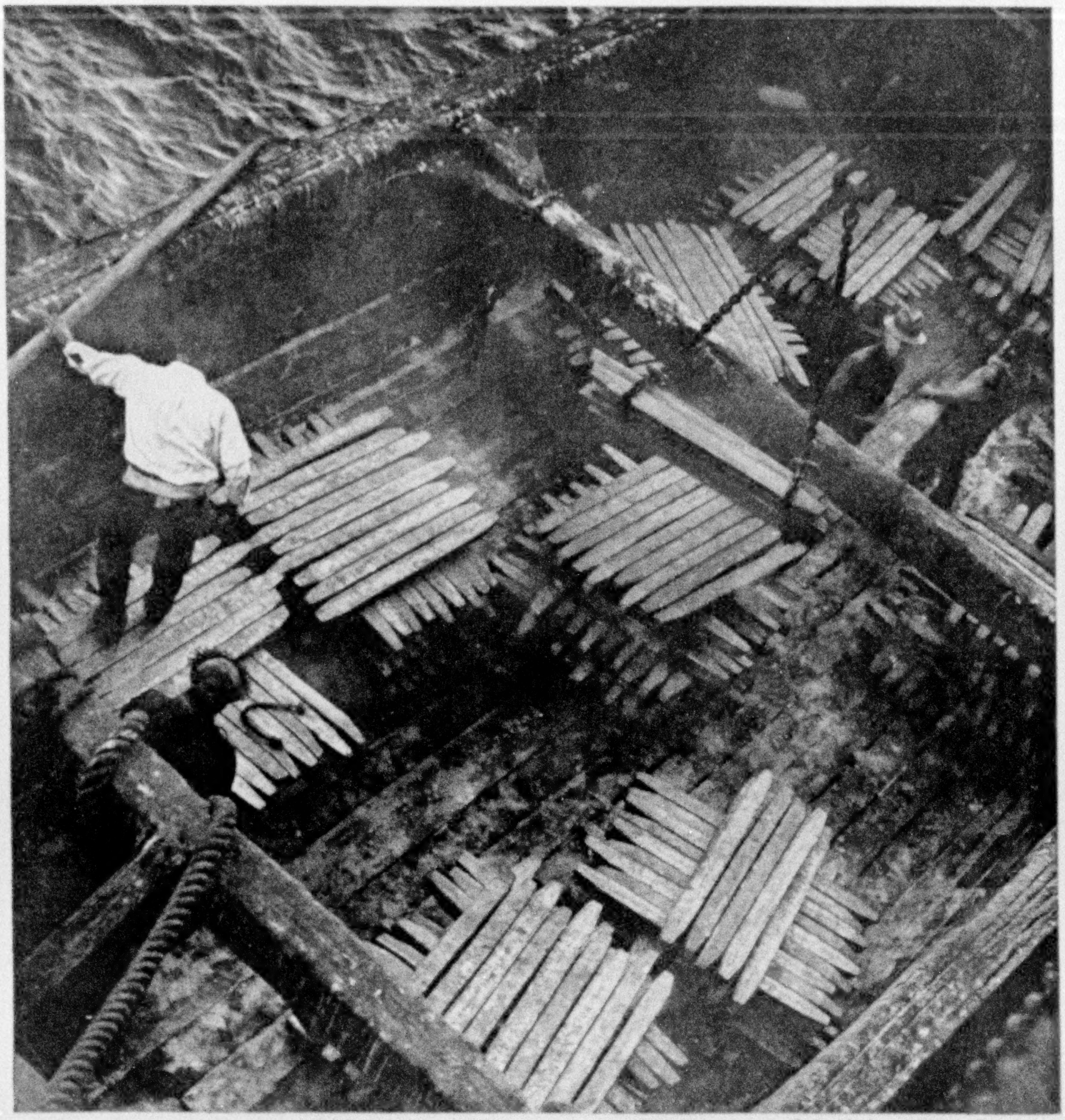
At this big American copper mine in Chile, plates from the electrolytic tanks, where the copper in solution has been plated onto lead "starting plates," are loaded on cars and carried to the furnaces to be melted. This electrolytic method produces the purest copper.



Photographs by Richard B. Hoit

CASTING THE MOLTEN COPPER

A machine-operated ladle pours the metal into four molds. Each mold contains from 175 to 200 pounds of 99.6 per cent pure copper.



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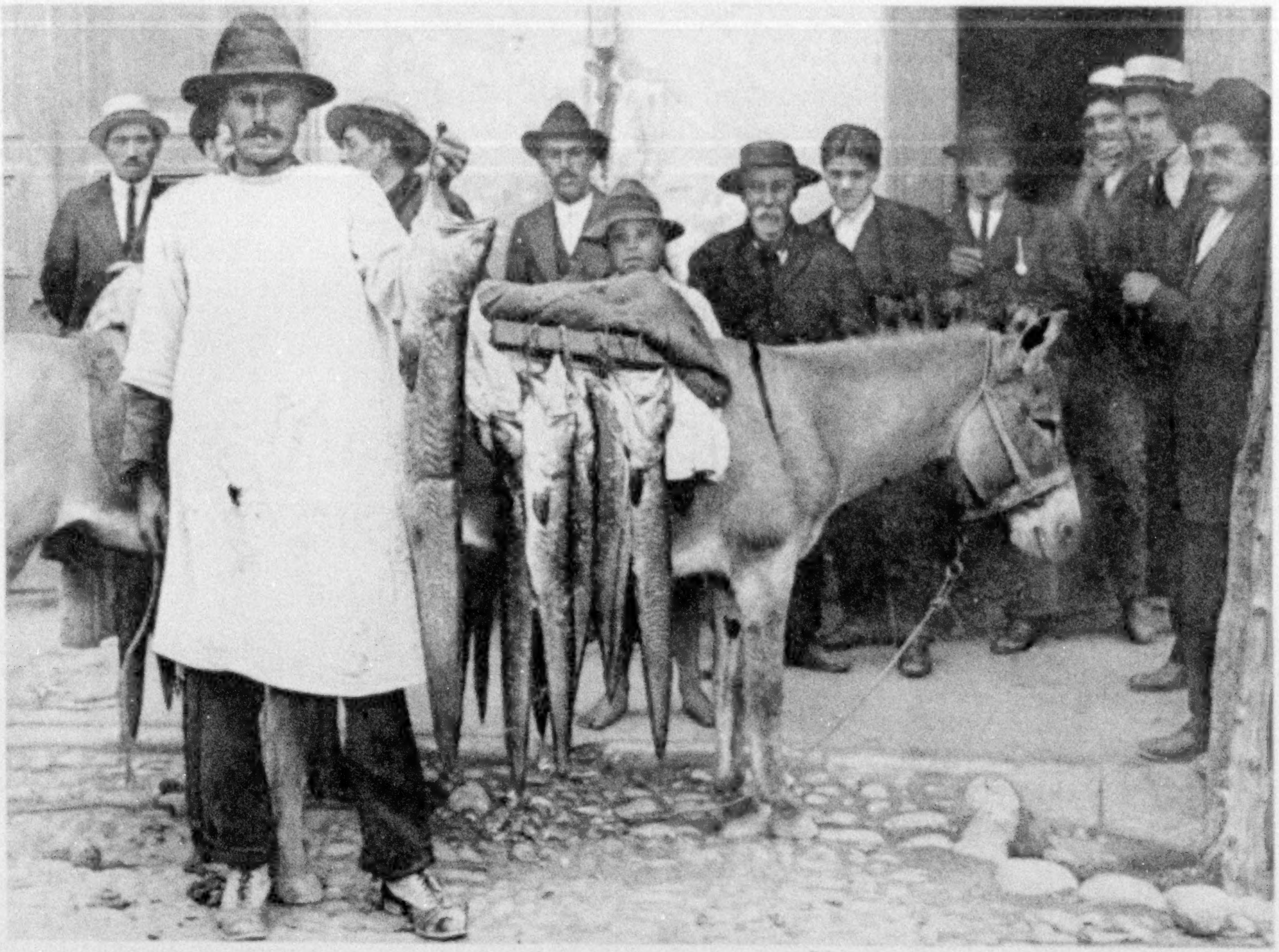
A BARGE-LOAD OF COPPER

One of the copper deposits in northern Chile is said to be the largest of its kind in the world, with the possible exception of a Peruvian copper property not yet thoroughly prospected. Nitrate and copper to-day, and manganese, perhaps, to-morrow, guarantee Chile's economic place in the world's markets.

Metal mining dates back to the days when the Chilean aborigines paid tribute to the Incas in gold and silver. Nitrate and copper to-day and manganese, perhaps, to-morrow guarantee the nation's economic place in the world's markets. Cobalt, nickel, lead, and sulphur are mined.

Two rival American mining companies operate gigantic copper properties. I visited one camp, a transplanted American city with 15,000 inhabitants, where good old U. S. A. jazz resounded by night through the canyon. One of these properties is the largest of its kind in the world, with the possible exception of a Peruvian copper mine not yet thoroughly prospected. By the electrolytic method here employed, the purest copper is produced.

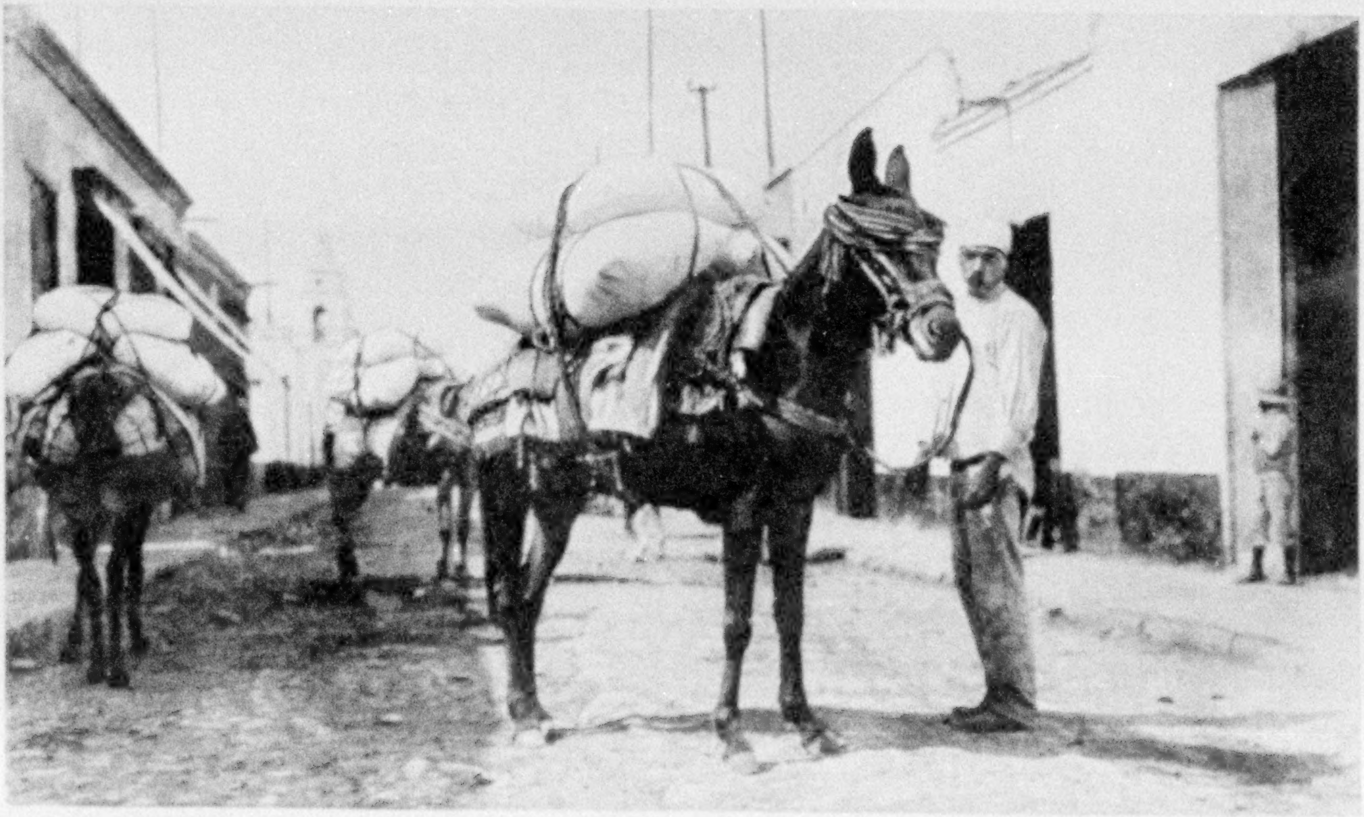
We met a group of engineers and geologists, representing a Japanese syndicate, exploring Chile's undeveloped mineral wealth. They proposed to acquire



Photograph by Publishers' Photo Service

SEA-EELS FOR SALE!

The fishman is offering his catch of congrio, a fish which derives its Spanish name from its elongated appearance. It is found in northern Chilean and southern Peruvian waters.



Photograph by Harriet Chalmers Adams

FLOUR FOR THE INTERIOR

In the days of '49 the bread of the California miners was made from Chilean flour. Wheat is raised principally in central Chile, where the long, fertile valley between the mountain ranges is like the golden valley of California. Agriculture represents a high proportion of Chilean industry, one and a quarter million acres being cultivated for wheat.

Photograph by Publishers' Photo Service

THIS FRUIT VENDER'S PACK ANIMAL IS EQUIPPED WITH COWHIDE PANNIERS

After the journey through the northern desert, it is refreshing to reach those irrigated valleys where the finest grapes and melons are grown.

mines and work them on a grand scale with modern methods.

Under the jurisdiction of the Department of Caldera, in which Copiapó is situated, is an isolated Chilean island, 2,000 miles west in the Pacific—Pascua, or Easter Island. It is 1,400 miles from Pitcairn, its nearest inhabited neighbor. The Chileans have a disconcerting way of speaking of this far-away oceanic possession as they would of a near-by province. A meteorological station is located on the island.

With its immense stone terraces and colossal monolithic images, Easter Island is one of the threads in that tangled skein, yet to be unraveled, of prehistoric Pacific migrations. Are these South Pacific isles the top of a submerged continent? Were they the stepping-stones of an ancient Asiatic civilization which migrated eastward to the New World, leaving its imprint on a primitive Americ people.*

The archeological field of northern

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* See "The Mystery of Easter Island," in the National Geographic Magazine for December, 1921.

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EXPORTING WOLFRAM ORE

Wolfram, the ore from which tungsten is extracted, is also exported from northern Chile. Tungsten is used in the manufacture of tool-steel and for the filament in incandescent lamps.

Chile is merely scratched. Under the drifting sands of the vast Atacama desert lies the record of a pre-Incan race. In the Valparaiso Museum I saw a mummy recently unearthed in the Atacama region. The director told me that it differs from the mummies heretofore discovered on the west coast of South America, being more like the Egyptian type. In a collection in the Chilean capital I saw implements and pottery of this Atacama culture differing widely from archeological remains in Peru and Bolivia.

Continuing south from Copiapó, little by little the desert flora grew from tufts of grass and stunted bush to tall algarobas and cacti of many varieties, one with a great red bloom. At Vallenar we entered a wide, irrigated valley, emerald green with alfalfa, and vines heavy with those luscious white grapes whose equal I have found in no other part of the world.

The vine, brought originally from Spain in colonial days, is now cultivated throughout an extensive range. The French vine, popular in certain provinces,

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WHEN THE BIG SHIP COMES INTO HARBOR

When an ocean liner anchors off the port of Coquimbo, rowboats put out from the shore laden with fruit from the fertile valley of the river Elqui. Here the wide, irrigated plain is emerald green with alfalfa and vines heavy with luscious white grapes.

was introduced in the fifties. Chilean wines are celebrated throughout Spanish America. Here the manufacture of wine is regarded as a national industry and few advocates of prohibition place light wine and beer on the black list.

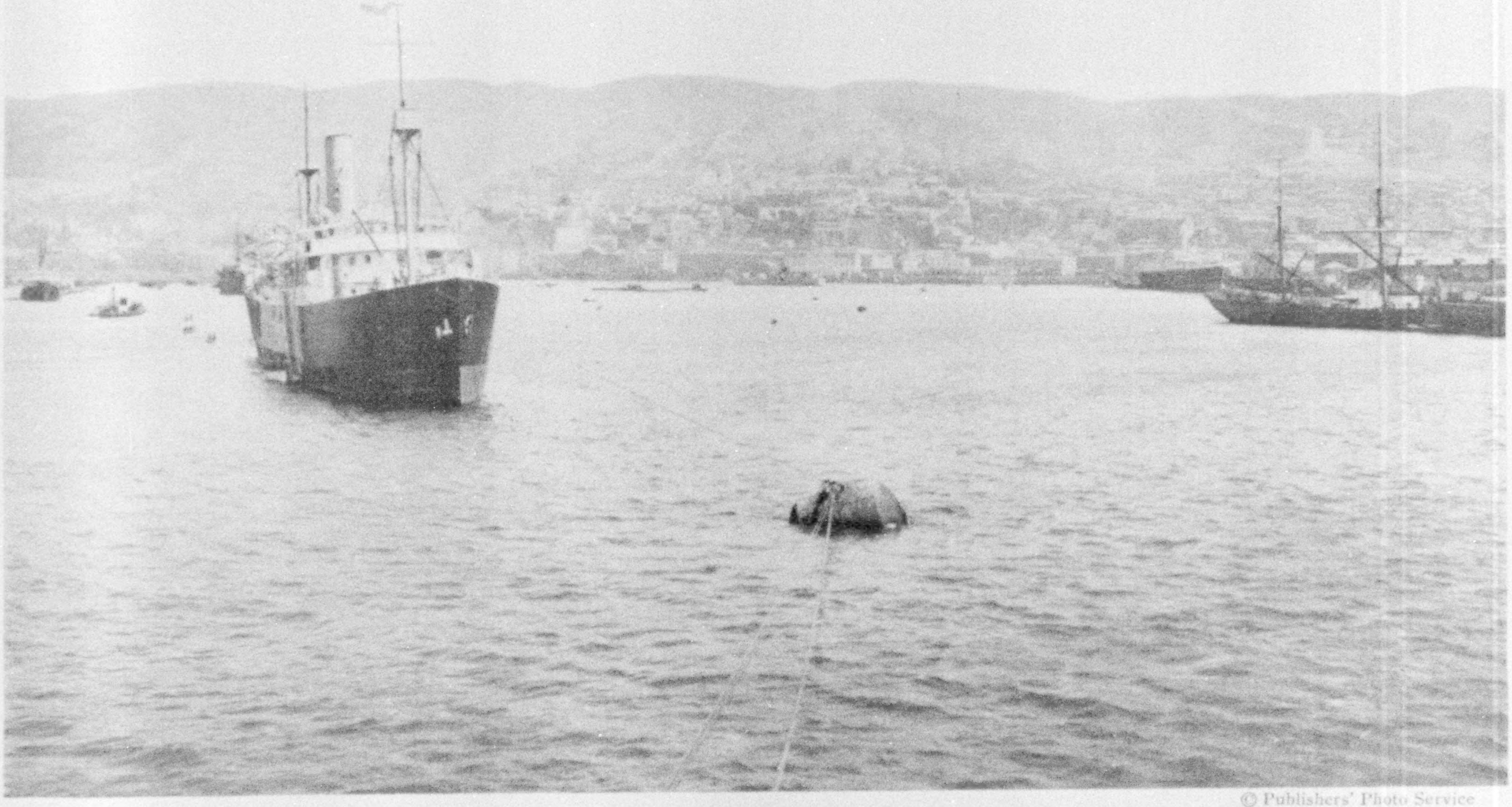
The chief producers market their high-grade brands with a little metal tag attached to each bottle. Each tag bears a number. The restaurant proprietor, when uncorking a bottle, keeps the tag. Every month there is a lottery, and those holding tags with the winning numbers receive cash prizes. Some proprietors turn the tag privilege over to their waiters, who naturally urge the patrons to use the tagged brands.

At the River Elqui the longitudinal railway gives a twist seaward to serve the charmingly situated town of La Serena and Coquimbo, its port.

La Serena, now as tranquil as its name implies, dates back to 1544. In its early history its calm was twice broken by English buccaneers. In visiting its old churches, I was reminded that Chile was devoid of art and industry for two centuries of colonial rule; all church ornaments and books on sacred subjects were brought from Quito, Ecuador.

As you sail down the Pacific coast, you say good-by to verdure at Guayaquil; then follows the long stretch of desert coast through Peru and northern Chile. It is only as you near Coquimbo that green fields again greet you.

For a century and a half Coquimbo has been famed as a mining center. One of our North American steel companies has developed a remarkable iron property in the gigantic Tofo mines, where ore taken from a mountain of iron by steam-shovels



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VALPARAISO FROM THE HARBOR

The chief Pacific port in South America rises like an amphitheater from a crescent shore. It has a population of nearly 200,000. Extensive port works are under construction to protect the waterfront from the inroads of the sea. Valparaiso is the western terminus of the transcontinental railway, which extends 888 miles to Buenos Aires.

is conveyed by an electrically operated railroad to the pier and loaded directly, through chutes, into specially constructed steamers.

HOW THE CHILEANS TRAVEL

From Coquimbo the railroad again strikes inland. Two locomotives urged our train up the steep grade to the *cumbre*, the rack system being used for some 30 miles. Our fellow-passengers on the day train were middle-class Chileans. The élite patronize the express. In Chile, as in other of the South American countries, the middle class has gained strength since my first visit, in 1903.

The aisle was crowded with hand-bags of huge proportions, as very little luggage can be checked free of charge. We heard much grumbling about the terrific increase in fares—75 per cent for passengers and 50 per cent for freight. Since then there has been still another increase. Our car was the average day coach that one sees in the "States"—a little cleaner, perhaps. A placard on the wall gave the date when the car was last disinfected.

Each family carried an enormous lunch-basket, well stocked with cold meats, chicken, bread, fruit, wine, sweets, and other edibles.

The dining-car, used only at meal time in our country, is filled all day long in Chile, the tables being utilized for cards and dominoes. Smoking is permitted in the diner, as well as in the coaches. Our train carried no second-class coach. In the third class were four benches running the length of the car.

"Red caps" to carry luggage and uniformed armed guards for police duty were in evidence at the stations.

We entered a mountainous region where graceful palms covered the hillsides. This is the palm from which the famous *miel de palma* (honey of the palm) is obtained. The tree is not tapped, as in the production of maple sugar, but is felled. The sap obtained is converted into a syrup, in great demand to serve with hot cakes, here known as "panqueques." Featured also on the menu we find two other old acquaintances—"cau-ktailes" and "beefteackes."

It takes six days of daylight travel from Antofagasta to Calera. Here we meet the lateral railway in the Aconcagua Valley, connecting the town of Los Andes, at the foot of the mountains, with Valparaiso.

The Aconcagua Valley is Chile's gem, a lovely vale where a merry little river, dashing down from crystalline heights, is bordered by velvety green hills. We are now in the rich agricultural region which stretches far south to the Bio-Bio River. This and adjoining valleys, the geologists tell us, are the remains of ancient fjords like those we still see in far southern Chile.

In ages long past, all this country was a maze of fjords and archipelagoes. In the Tertiary period the Sequoia, mammoth of the plant world, to-day represented only by our "Big Trees" of California, grew on these Andean slopes.

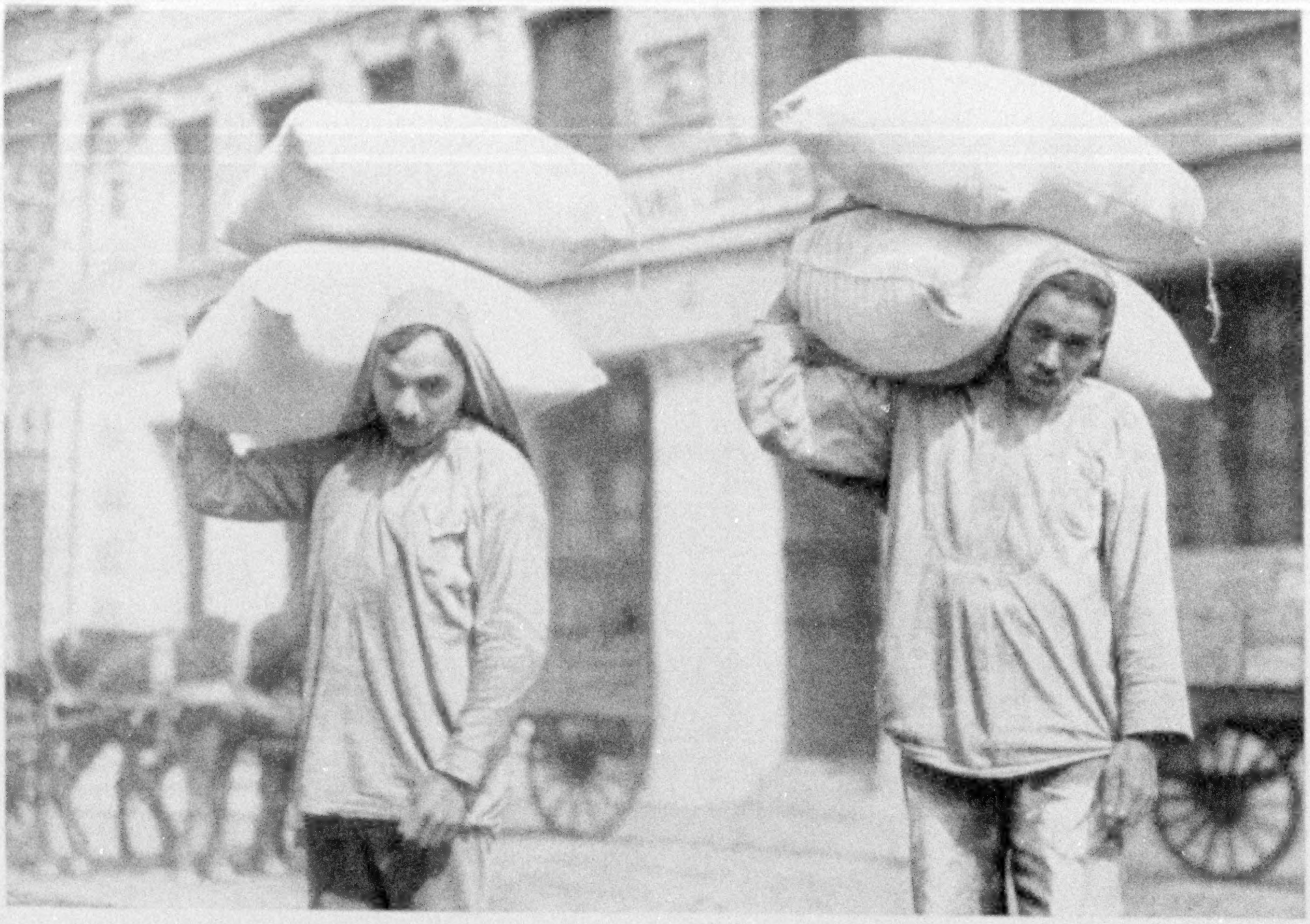
Where the coast range of the Andes dips its feet in the sea Valparaiso, South America's chief port on the Pacific, rises like an amphitheater from the crescent shore.

To me this city has never seemed typically South American or even distinctly Chilean. There are so many Britishers and Chileans of British blood here that the place has much in common with British colonial ports. Cochrane and O'Higgins, Simpson and O'Brien, are a few of the many British names in Chile's Hall of Immortals. Ever since the war of independence, men of their blood have here played star rôles. In the late World War thousands of men of British blood left South America to serve in His Majesty's forces.

ELEVATORS CONNECT THE STREETS OF VALPARAISO

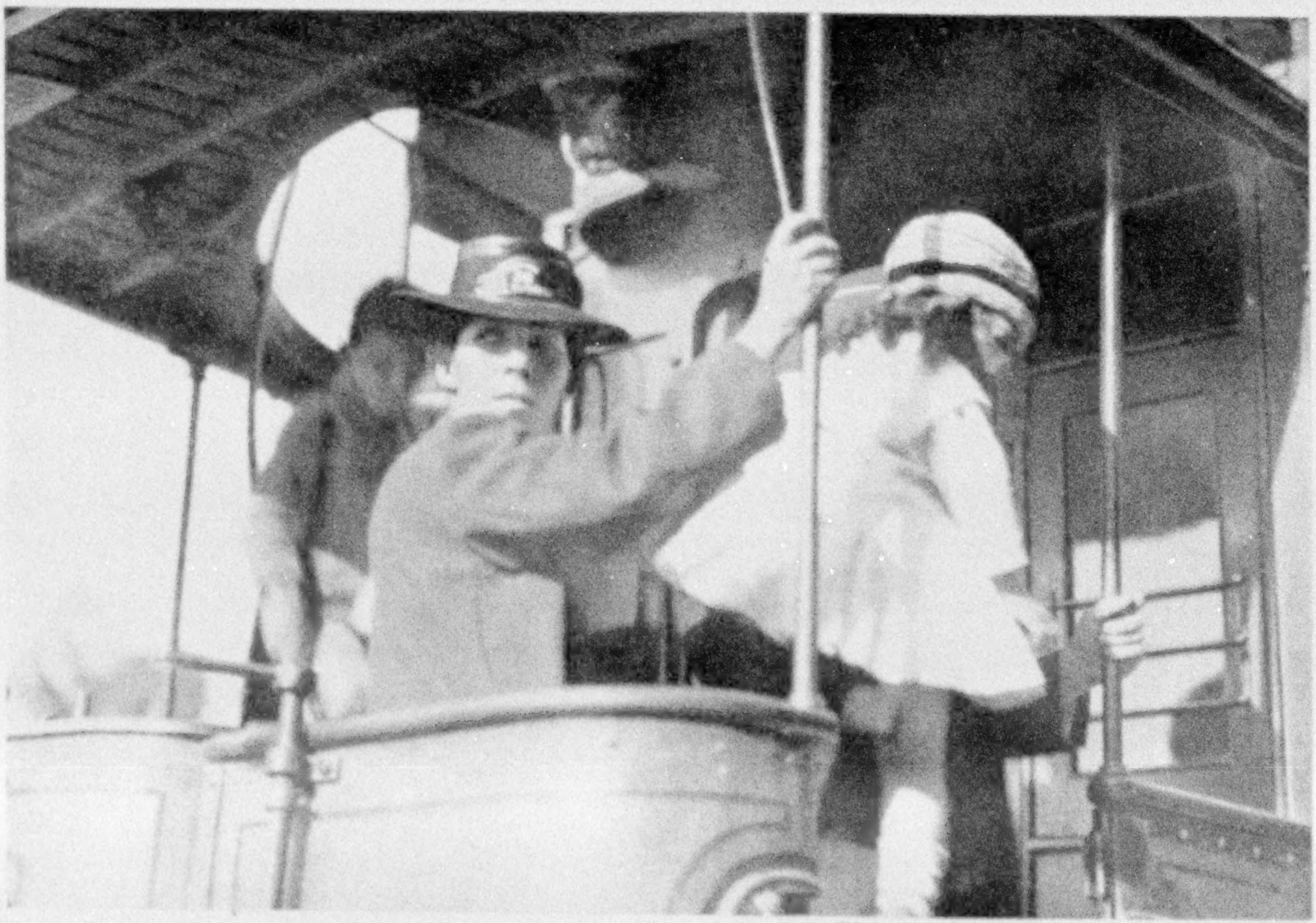
Like Hongkong, Valparaiso is formed of a few level streets on land in part reclaimed from the sea, and a residential section on the hills above. Elevators on inclined planes, known locally as "ascensors," connect the streets by the shore with those on the heights.

These lifts are the first objects in the port to claim the traveler's attention and the ones that dwell longest in his memory. They are operated in the open, all day long and far into the night, lifting and lowering thousands. The view from one of these nearly perpendicular inclines, of



LONGSHOREMEN OF VALPARAISO

Noted for his powerful physique, the brawny, bare-legged *roto* shades his head with a white cloth in oriental fashion.



Photographs by Harriet Chalmers Adams

A WOMAN STREET-CAR CONDUCTOR OF VALPARAISO

When, many years ago, the men of Chile went to war, women were first employed as street-car conductors. So efficiently did they fill the position that they were retained after the emergency had passed.

town, harbor, and encircling hills, is not unlike that other wonderful view from the peak above Hongkong.

VALPARAISO IS WAGING A WINNING BATTLE WITH THE SEA

The harbor of Valparaiso is called a bay by courtesy. It is almost an open roadstead. The traveler is impressed with the stupendous work, still in progress, for protecting the shore from the terrific inroads of the sea. At the season of *temporals* the surf dashes in with relentless fury, tearing down the massive masonry of the seawall and devastating the waterfront; but bulwarking against the enemy goes on untiringly and in time the port will win.

A norther sweeping in is a mighty spectacle to behold. I prefer to watch it from the shore.

> We've slipped from Valparaiso,
> With the Norther at our heels.

Well do I remember it! It was just at the beginning of one of these storms. The passage from shore to ship was made in a rowboat. A mountain of undulating water towered on either side of our frail craft, and only miraculously, on the crest of the wave, did we land, at last, limp and drenched, on the heaving ship's deck. The ship could not hold anchor, and it was with a prayer of thanksgiving that we beat toward the south.

I am often asked what interested me most in Chile. Were I a materialist, I might say "the food." In no other part of the globe is food at the leading restaurants better than in the south temperate cities of Valparaiso, Santiago, Buenos Aires, and Montevideo.

Valparaiso's market is stocked with excellent meat—beef from Argentina, fattened in Chile; veal from Tierra del Fuego; sea food from cold southern waters; fresh-water fish from snow-fed streams; dairy products from the southern German colony; vegetables from central Chilean valleys. With tropical fruit from Ecuador, native wine of the best quality, delicious sweets in the form of fruit and sugar paste, augmented by almost any imported delicacy you may desire, I dare not recommend certain of these restaurants to friends of increasing girth.

Photograph by Harriet Chalmers Adams

A NEWSBOY OF VALPARAISO

Unlike Buenos Aires, where many of the newsboys are of Italian blood, the Chilean urchin is distinctly *Chileno*. The first daily newspaper in the country, *El Mecurio*, was established in Valparaiso in 1827. It exists today. There are now 550 publications in Chile.

Chilean sea food, known as *mariscos*, deserves special mention. Mussels and oysters come from beds off the island of Chiloé and lobsters, of unusual size, from the islands of Juan Fernandez.

ROBINSON CRUSOE'S ISLE FAMOUS FOR ITS LOBSTERS

Más-á-Tierra, the largest of the Juan Fernandez group of three islands, lying 360 miles southwest of Valparaiso, is Robinson Crusoe's isle. It was here, in 1704, that Alexander Selkirk, a Scottish

Photograph by Richard B. Hoit

CAKE-SELLERS AT A RAILROAD STATION IN CENTRAL CHILE

sailor, was dropped ashore from an English galley at his own request. If we are to believe his biographers, it was a clear case of "Mr. Captain, stop the ship: I want to get off and walk." Selkirk had dreamed of shipwreck and yearned for *terra firma*.

Defoe, in writing his famous story, made the West Indian island of Tobago the setting for his hero's adventures, instead of the Chilean island, where Selkirk lived for more than four years.

Besides Selkirk and the lobsters-of-renown Juan Fernandez has its unique chonta palms, now becoming rare, and other semi-tropic flora. Before the axe of thoughtless man felled many of the great trees, there was a forest of sandalwood, far removed from its native habitat.

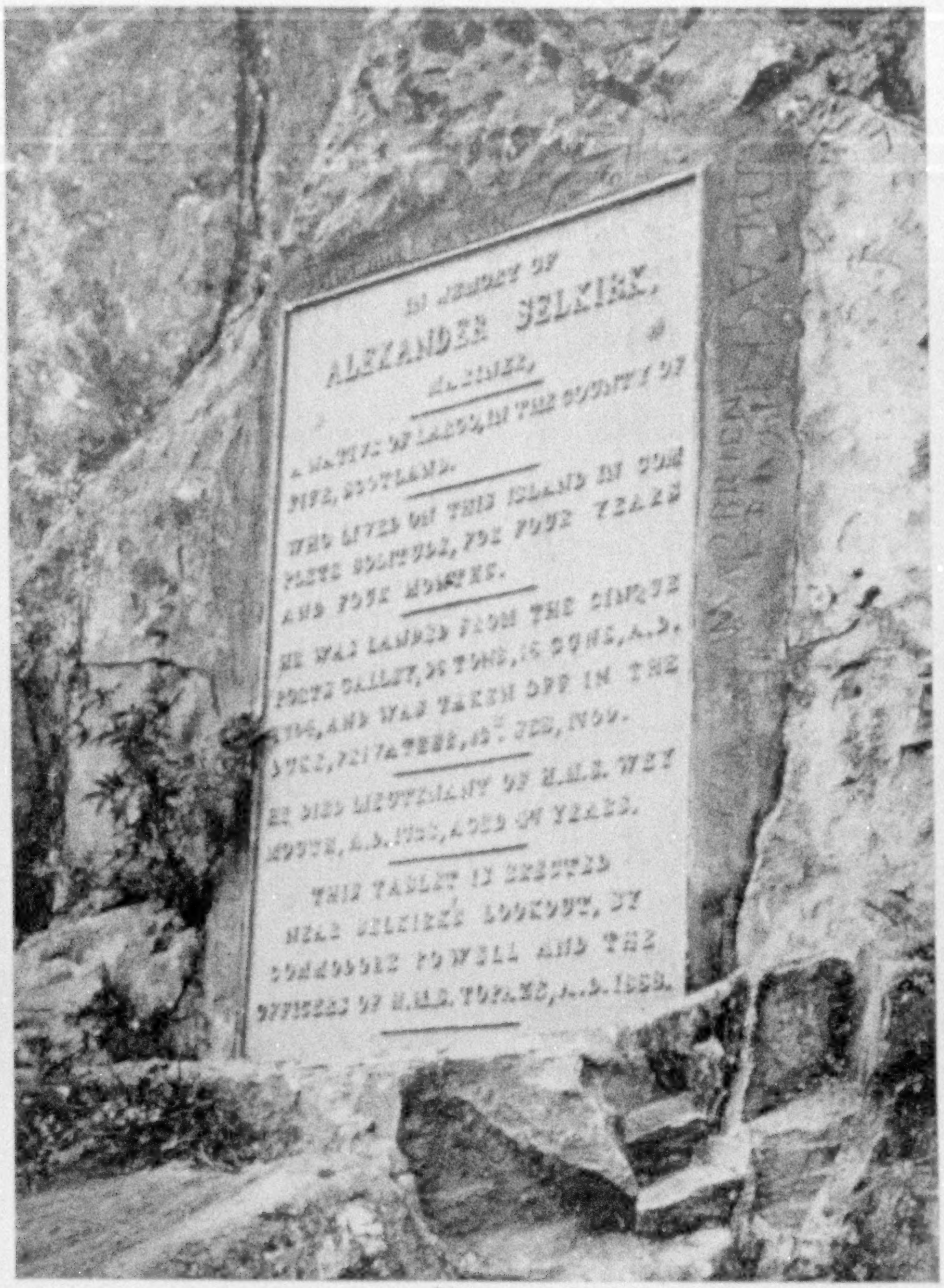
Valparaiso must have been lively in 1849, when my pioneer forefathers were trailing to California across the plains and round the Horn. It was then the emporium of trade with the newly opened gold-fields and a free port, where ships could bring in goods to be held in bond, paying only a small duty on transshipment. The bread of the California miners was made from Chilean flour.

The situation of Santiago, Chile's capital, nearly 1,800 feet above the sea, is most attractive, ranking in beauty among South American cities second only after Rio de Janeiro and mating La Paz, Arequipa, and Caracas.

SANTIAGO'S SUBLIME PANORAMA

Come with me at the sunset hour to the summit of Santa Lucia, that singular hill of volcanic origin in the heart of the city, where Pedro de Valdivia, the real conquerer of Chile, built his first defense against the natives. This once barren knoll, 400 feet above the plain, has been transformed into a hanging garden. Over its tree-tops we look down on the great city of half a million souls—a city of low buildings and checker-board streets set in emerald meadows and encompassed by snowy mountains. Only at our own Mount Rainier have I seen flower-spangled fields and snow-draped crests in such close proximity.

Now, as the sun sets, the jagged Andean peaks, towering above purpling slopes, are aflame. It is a sublime panorama.



Photograph from Harriet Chalmers Adams

IN MEMORY OF ROBINSON CRUSOE

This memorial slab to Alexander Selkirk, immortalized as Robinson Crusoe, is on the largest of the Juan Fernandez group of islands, lying 260 miles southwest of Valparaiso. Here, in 1704, Selkirk, a Scottish sailor, was dropped ashore, at his own request, from an English galley.

In this part of Chile are many mountains whose summits can be won by Alpine enthusiasts. The view of green fields, blue ocean, and surrounding ranges from one of these crests is worth the most strenuous climb.

Californian poppies blowing in the breeze,
Arching blue of heavens, curving blue of seas.
Line on line of mountains, rising crest on crest,
Steeped in golden sunshine, Chile at its best.

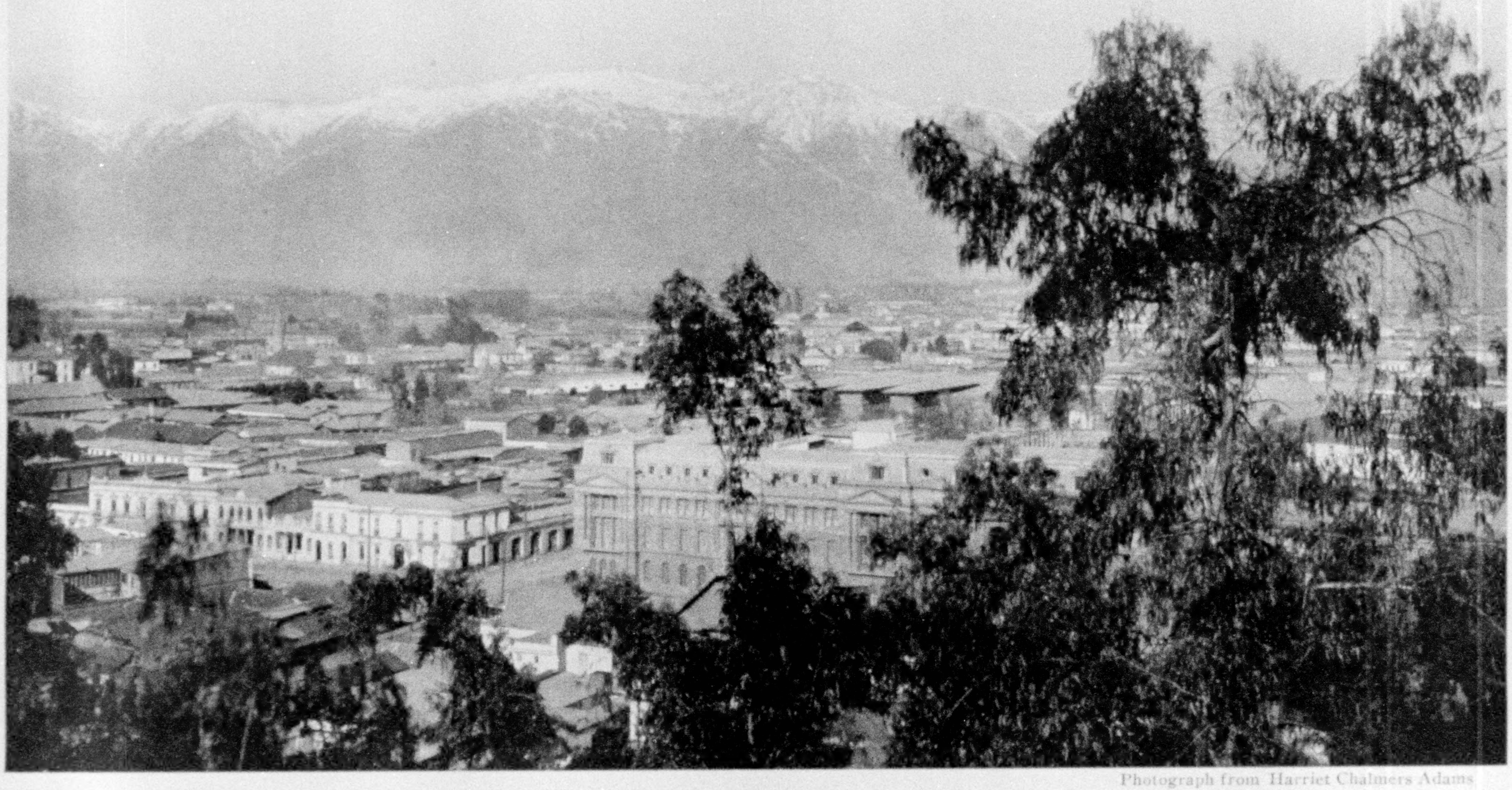
Mount Aconcagua, the highest peak in the Americas, just across the line in Argentina, wears its eternal snow-helmet. Aviators crossing the Andes fly past the volcano Tupungato. Up to the time of my writing, eight bird-men and one bird-woman have successfully dared the Transandine flight. Five were Chilean, two French, one Argentine, one Italian. There have been a number of unsuccessful attempts and two of the aviators lost their lives.

Since this is the story of my journey through Chile from tip to tip, we cannot linger in the capital, but must entrain again at Santiago, once more headed south on the longitudinal.

We are now in the long agricultural valley between the Coast Range and the Andes. Wheat-fields and vineyards border the track. Stately rows of Lombardy poplars and eucalyptus inclose the fields.

At the stations are female fruit-sellers uniformed in white. They have melons for sale—big yellow melons—which, like the grapes, take first rank. Last year a consignment of Chilean fruit—melons, peaches, apples, and grapes—arrived in the port of New York. Some of the melons, weighing seventeen pounds, sold for six dollars each. At the same time, Chile was importing oranges and lemons from California. Ripe olives, for which California is noted, have long been a product of Chile.

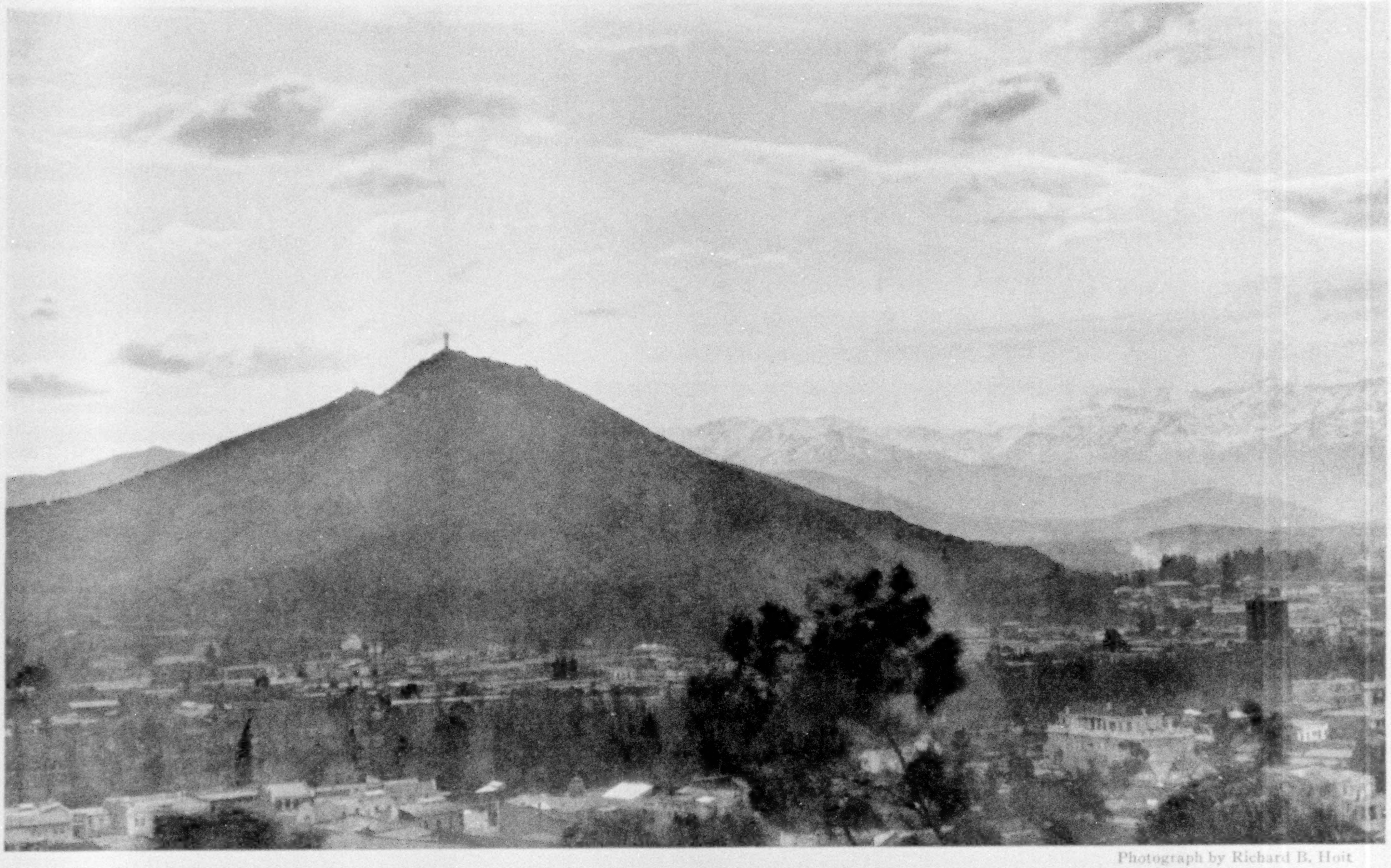
We pass Rancagua, a famous battleground in the war of independence, to-day the junction with a branch railway leading to a big North American copper property high up in the mountains. Now come the industrial towns of Talca and Chillan, with many one-story buildings.



Photograph from Harriet Chalmers Adams

SANTIAGO, AT THE FOOT OF THE ANDES

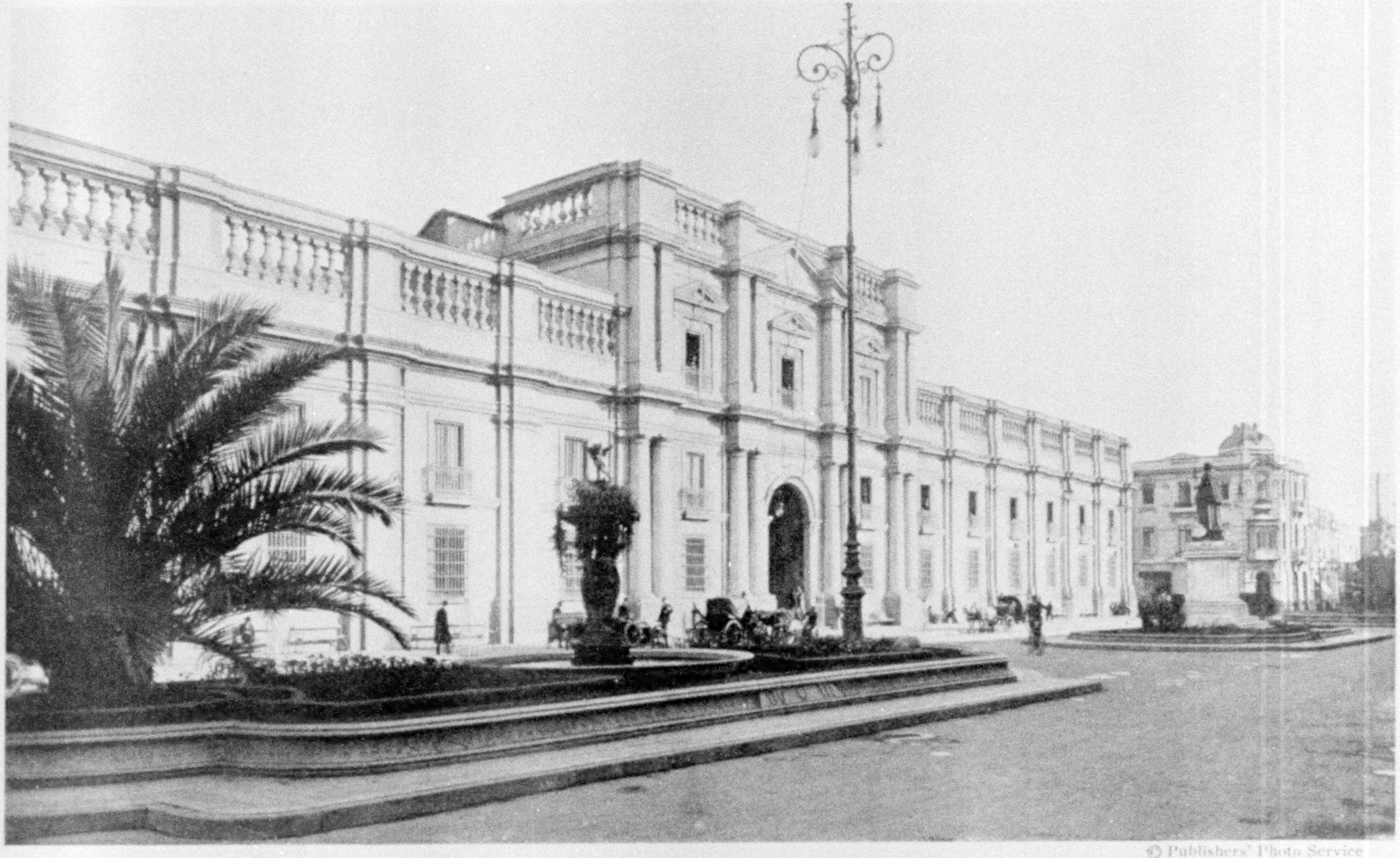
Few cities rival Santiago in beauty of situation—at the foot of the snow-crowned Andes, encompassed by emerald-green fields. This picture was made from the summit of Santa Lucia, that unique hill-park in the center of the city, where Pedro de Valdivia, conqueror of Chile, who founded Santiago on February 12, 1541, set up his first camp. Santiago has a population of more than half a million.



Photograph by Richard B. Hoit

VIEW OF SAN CRISTOBAL HILL AND THE ANDES FROM SANTA LUCIA, SANTIAGO

From a summit in the center of the Chilean capital we look toward the Cerro San Cristobal, surmounted by a statue of the Virgin. The Harvard College Observatory is situated on this hill. Beyond rise the Andes.



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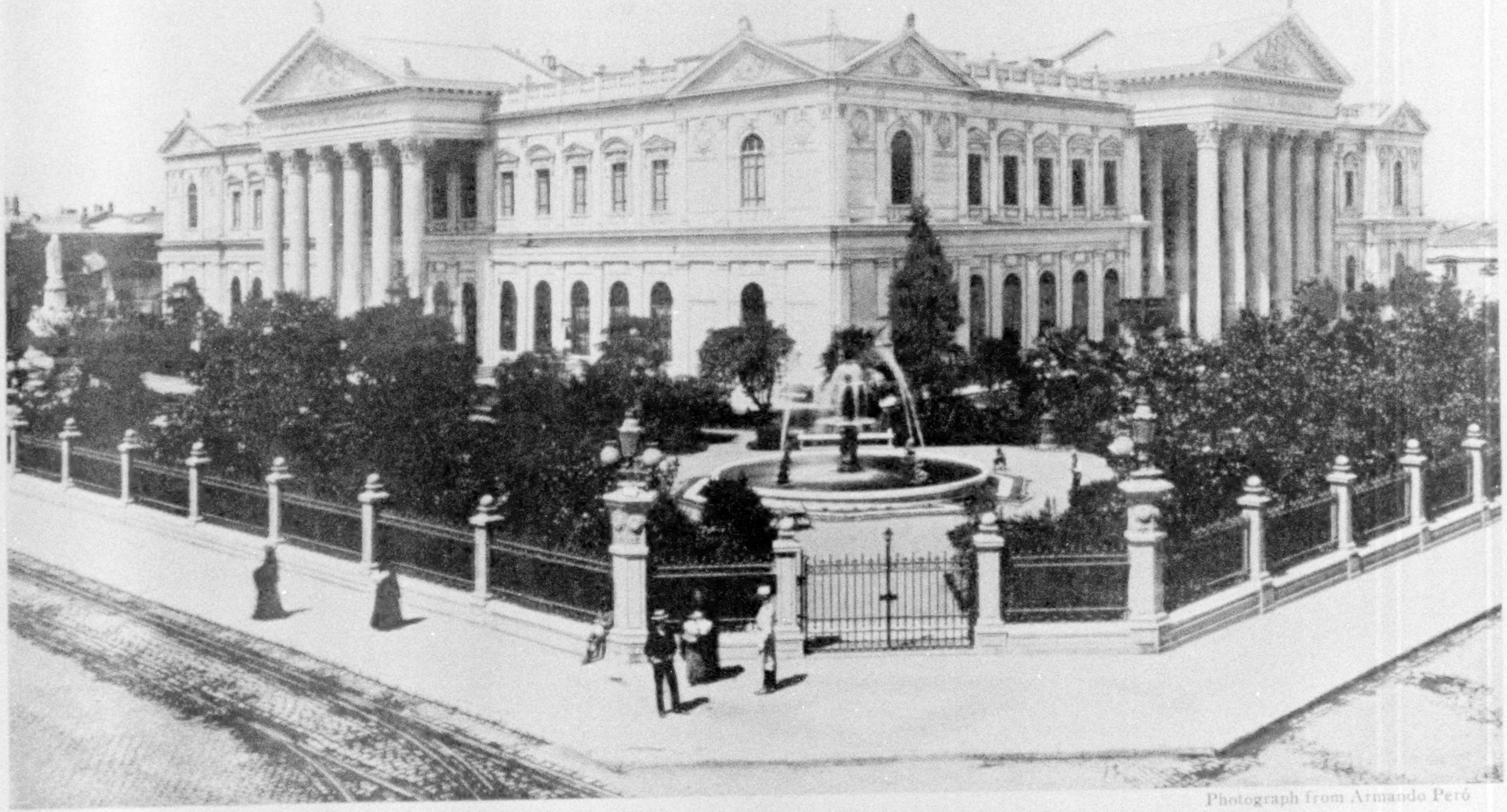
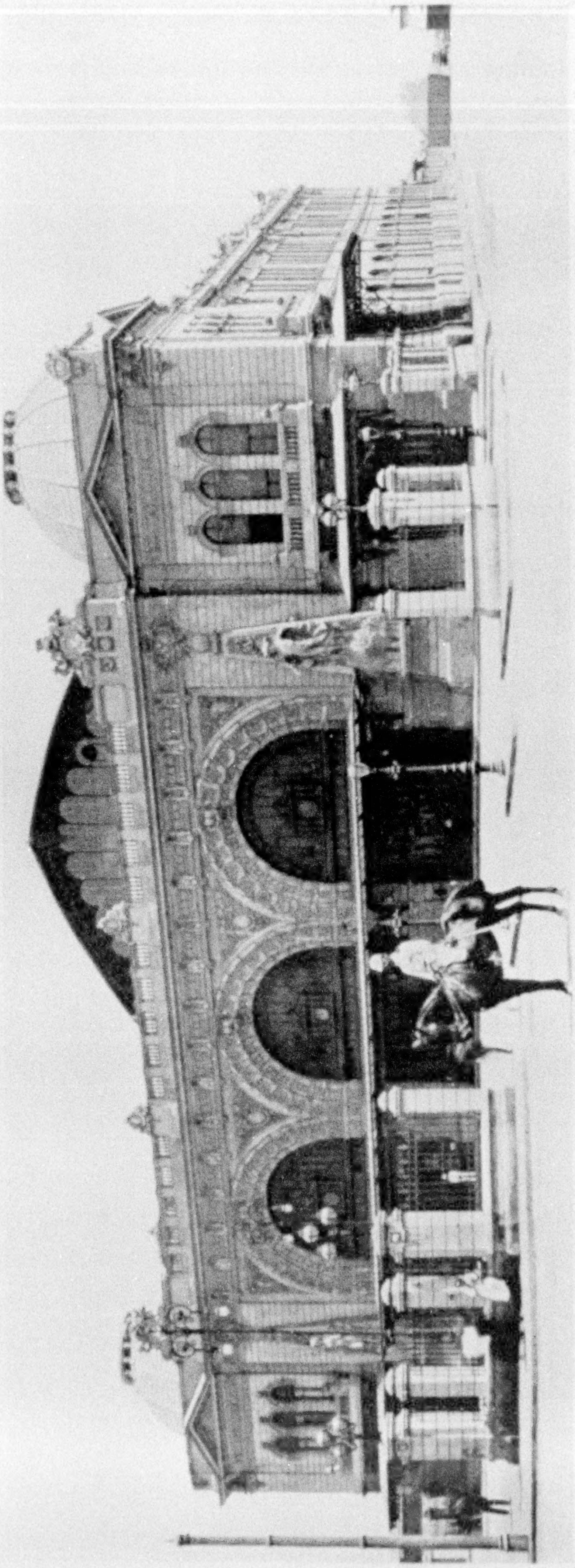
THE CHILEAN WHITE HOUSE, SANTIAGO

This palace, once the home of the national mint and still known as the Palacio de la Moneda, "La Moneda," is now the official residence of the President. Here also are the offices of the Departments of the Interior, Foreign Relations, Finance, and of Justice and Public Instruction. The building was begun in 1786 and completed in 1805.



Photograph from Armando Peró

HOME OF THE CHILEAN CONGRESS: THE CAPITOL BUILDING, SANTIAGO



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MAPOCHO RAILROAD STATION, SANTIAGO

It takes its name from the river Mapocho, which flows through the city. Here the passenger from Valparaiso or Los Andes detrains.

Industrial growth is slow but certain. Besides possessing raw material for manufacturing, Chile has unlimited water-power in the Andes for hydro-electric development.

THE CHILEAN COWBOY'S GAME OF "TOPIO"

From Chillan we drove to a neighboring village to watch the country-folk at play. The Chilean cowboy is less picturesque than his fellow on the other side of the Andes, the Argentine *gaucho*. His trousers are not as baggy and he is not as gaily bedecked with silver trappings. He is known as the *huaso*, which means "countryman," while the little country maid is the *huasita*. He is a splendid horseman, and his steed is high-spirited, with an Arab strain. His favorite sport is shared by his equine friend. We saw the ancient game of *topio*.

In front of a farmhouse, under the shade trees, were large, solidly built uprights with cross-bars. These elongated hitching-posts play an important rôle in topio.

The horsemen pair by lot and "line up" in front of the bar. One of the riders presses his horse forward against the bar, crossing and imprisoning the head of his opponent's mount. At the referee's call the game is on, and the rider of the imprisoned horse endeavors to free him.

The horses are as highly trained as our polo ponies, and, when matched with skillful riders, a single struggle may last an hour. In the preliminaries a dozen such contests are simultaneous, with short rests between. A day is often consumed in determining the final victor.

There is no more exciting sport for riders, horses, and spectators than a good topio match.

The Chileans have never cared for bull-fights or cock-fights, favorite sports with others of Spanish blood. Among transplanted sports, the educated class has taken to football, tennis, and polo, but is not enthusiastic over golf or baseball. The national dance, the *cucca,* once popular throughout the country, is still in vogue in many of the villages.

We sped southward through the irrigated bottom lands of central Chile, with their refreshing alfalfa fields, their browsing cattle. It is a country of large estates, where the *roto* toils for the master—the ancient feudal system.

CONCEPCIÓN, CHILE'S THIRD CITY.

Few foreigners stop between Santiago and Concepción, a day or a night journey on the express. Concepción, Chile's third city in importance, is on the north shore of the Bio-Bio River, not far from the sea.

The Bio-Bio, the largest river on the west coast of South America, was long the dividing line between civilized Spanish Chile and the territory of the indomitable Araucanian Indians, who for more than three centuries defied their country's invaders. As a frontier post and the seat of innumerable earthquakes, Concepción has known turbulent days.

Nine miles from Concepción lies its seaport, Talcahuano, with the best harbor in southern Chile. It is the seat of the whaling industry, whales being found nearer the shore here than in most parts of the world.

Southward lie the ports of Coronel and Lota, where vast coal mines extend under the sea. Although Chile is the principal coal-producing country of South America, with an estimated coal reserve of two billion tons, only one and a half million tons were produced last season, great quantities of coal being imported from the United States, Great Britain and Australia and fuel oil from Mexico.

When we crossed the Bio-Bio River we entered that romantic territory known to the Chileans as the *Frontera.* Within the memory of the living, white men might not enter this region of great forests and noble rivers. It was the domain of the Araucanians.

We dropped off in Temuco, to study and photograph this once strongest and most valorous of all South American tribes, for centuries unconquered by Inca, Spaniard, or Chilean. It was left to evil old John Barleycorn at last to batter down their splendid resistance.

Nowadays the Indians and Chilean peons cannot get their drink too strong. They mix the native *aji,* a very hot pepper, with crude brandy to give it sufficient "pep."

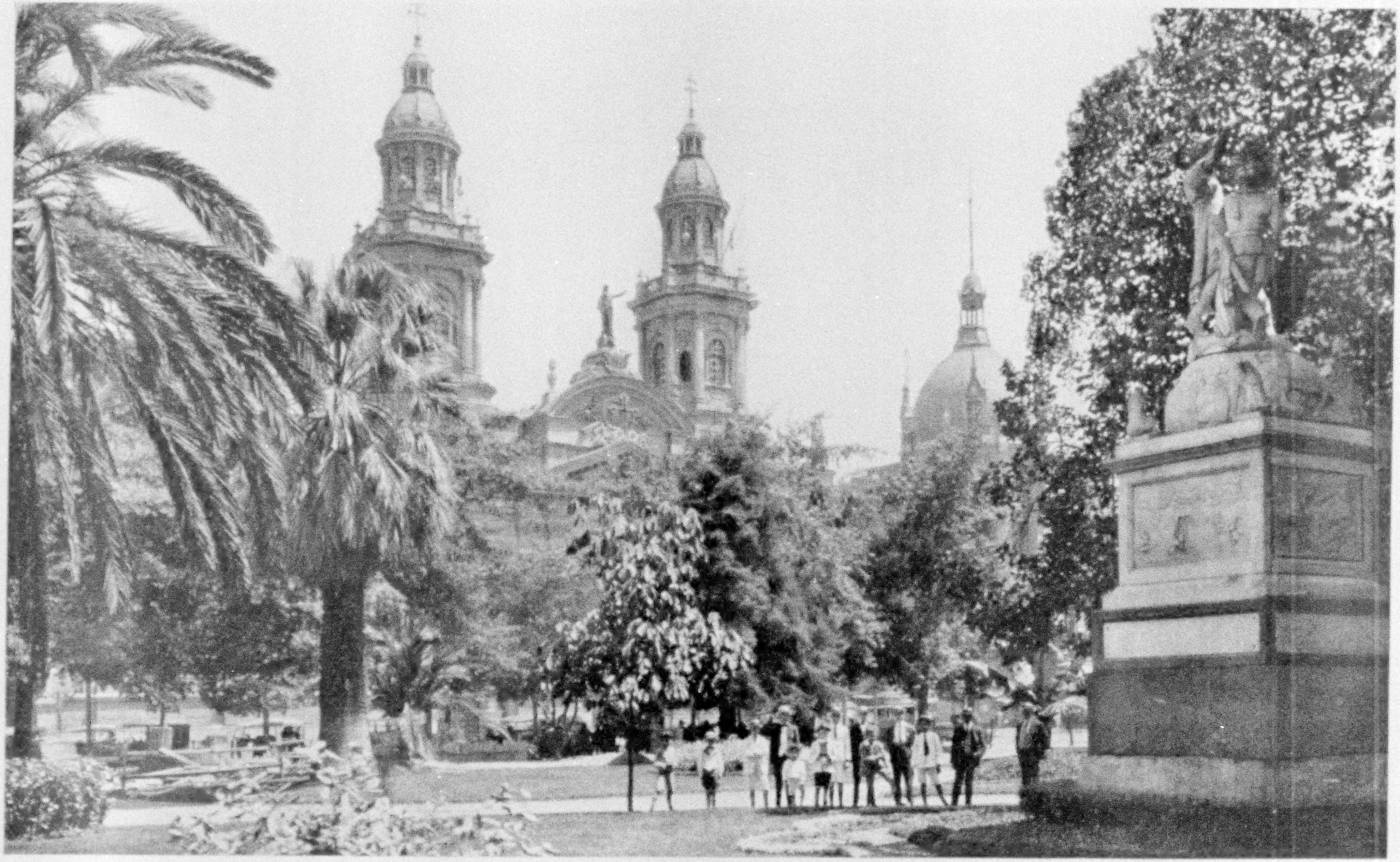
There are about 100,000 Araucanians left in southern Chile. They call themselves *Mapuche,* which means "people of the country." They live in no particular place, being scattered through the forest from the ocean to the Andes; but there are more of them around the town of Temuco than in any other section. Here they farm on a small scale, raising wheat, corn, potatoes, and apples; some raise cattle. In the mountains to the east they raise cattle and sheep.

Formerly these Indians had a much wider range, extending across the Andes toward the Atlantic. Some of their relatives, now differing widely in customs, still live on the Argentine side of the mountains.

The Incas of Peru failed to subjugate these people and gave them the name of Araucanians, derived from the Quichua word *aucca,* meaning rebel; but vestiges of Peruvian culture somehow drifted down to them. From the Incas they learned the art of weaving, and woolen blankets replaced the old guanaco-skin garments.

The guanaco, now found on the Patagonian plains east of the Andes, still strays occasionally, through some low-lying mountain pass, into Chilean territory.

The black and white designs on modern Mapuche ponchos remind me of certain ancient Central American designs. The mass of silver ornaments still worn by Mapuche women show Incan influence—the silver figures of llamas and the silver pins fastening the blanket across the woman's breast (the tupu of the Incas).



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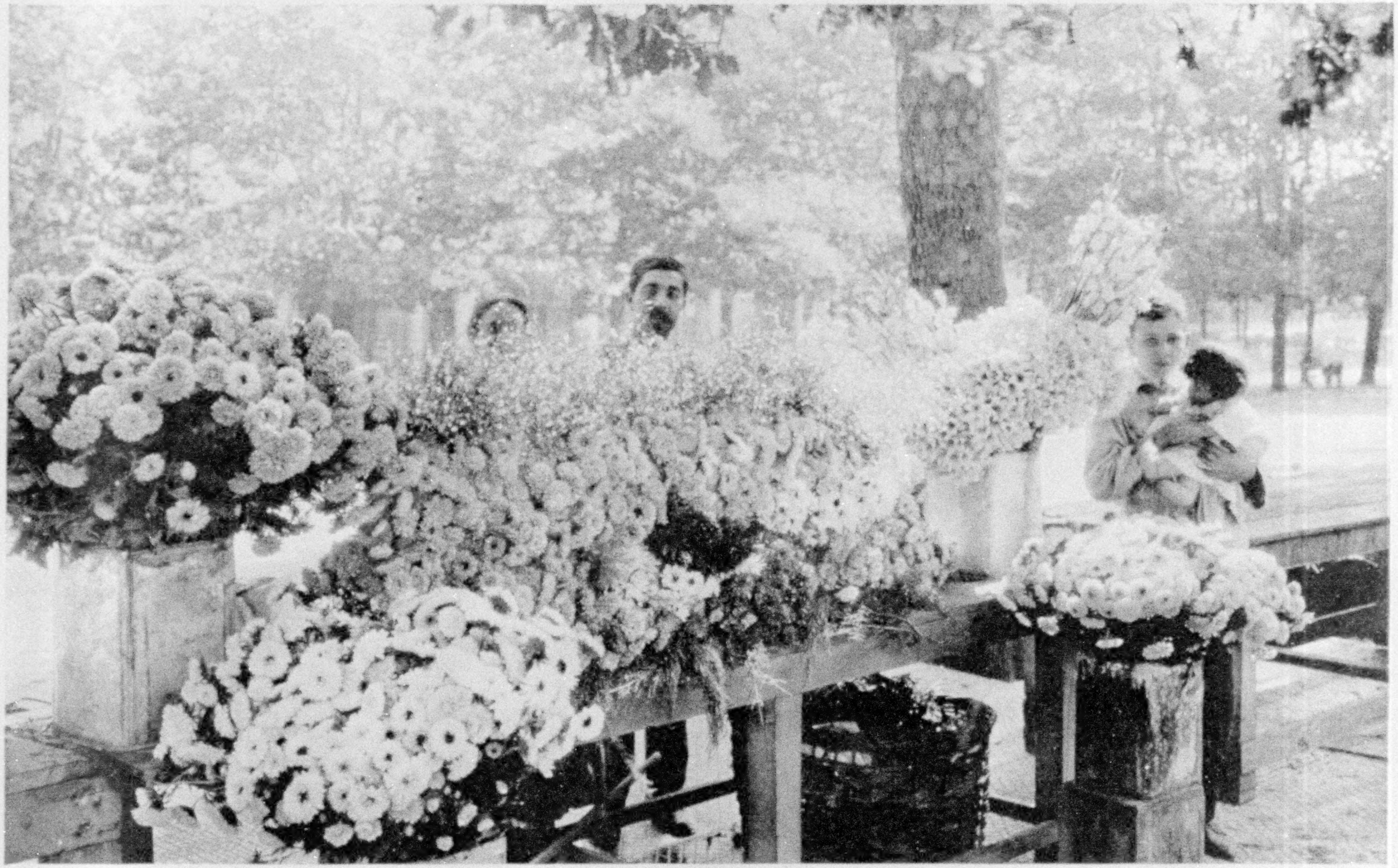
PLAZA DE ARMAS AND THE CATHEDRAL, SANTIAGO

In colonial days this beautiful park was known as the Plaza Mayor, and the chief government buildings surrounded it. The cathedral, facing the square, stands on the site of the temple erected by Pedro de Valdivia, the founder of Santiago.



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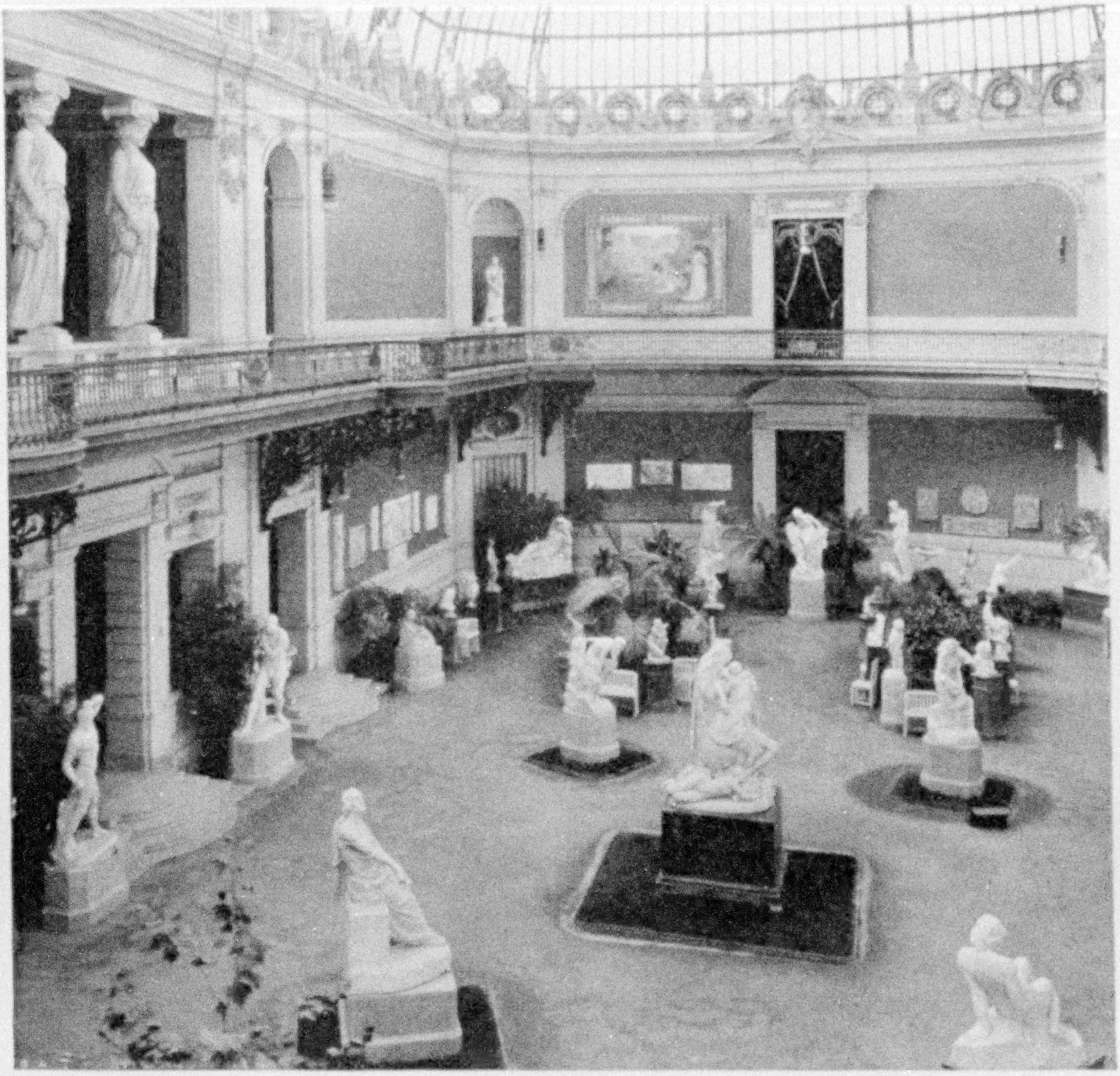
FLOWER-SELLERS OF THE ALAMEDA: SANTIAGO

Like California, Chile is a land of flowers. The flower booths on the Alameda, or Avenida de las Delicias, remind the traveler of similar ones on the Rambla, in Barcelona.



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INTERIOR OF THE NATIONAL ART MUSEUM: SANTIAGO

The Palacio de Bellas Artes contains, besides a museum, a school of fine arts. On the ground floor may be seen the works of many Chilean sculptors, while the galleries surrounding the main salon contain paintings by the nation's most famous artists as well as those of the old masters.

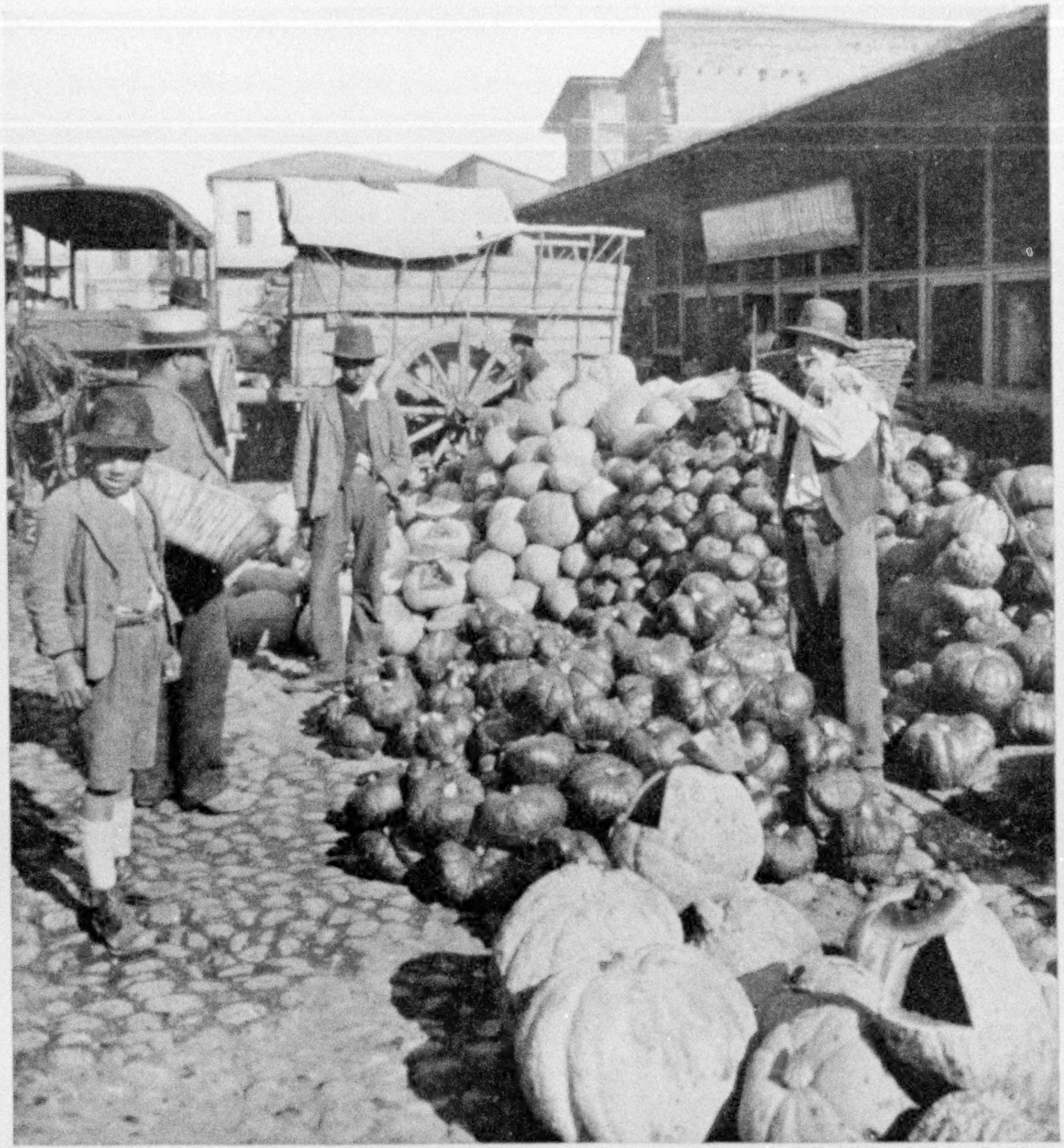
The cross, featured in Mapuche ornaments, erected over graves, and painted on the faces of warriors during festivals, is not, curiously enough, the Christian cross introduced by the Spaniards. It is the eight-pointed Maltese cross and antedates the European invasion.

COSTUMES AND CUSTOMS OF THE MAPUCHE

Incan influence can also be noted in certain Mapuche words. A species of seaweed, for instance, here much prized as food, is known as *cuchayuyu*. To the Incas it was *cocha yuyu*, "garden truck of the sea." I compiled quite a list of these Incan-Mapuche words.

The women cling to the old type of costume—the black or deep indigo-blue belted blanket gown, pinned over the shoulders. They wear their abundant black hair in two long queues, wrapping a cloth about the head, turban-fashion. Their enormous silver ear-pendants and massive necklaces give them a bizarre appearance.

The barbarous fashion of plucking the eyebrows, popular of late in the United States, has long been practiced by Mapuche belles.



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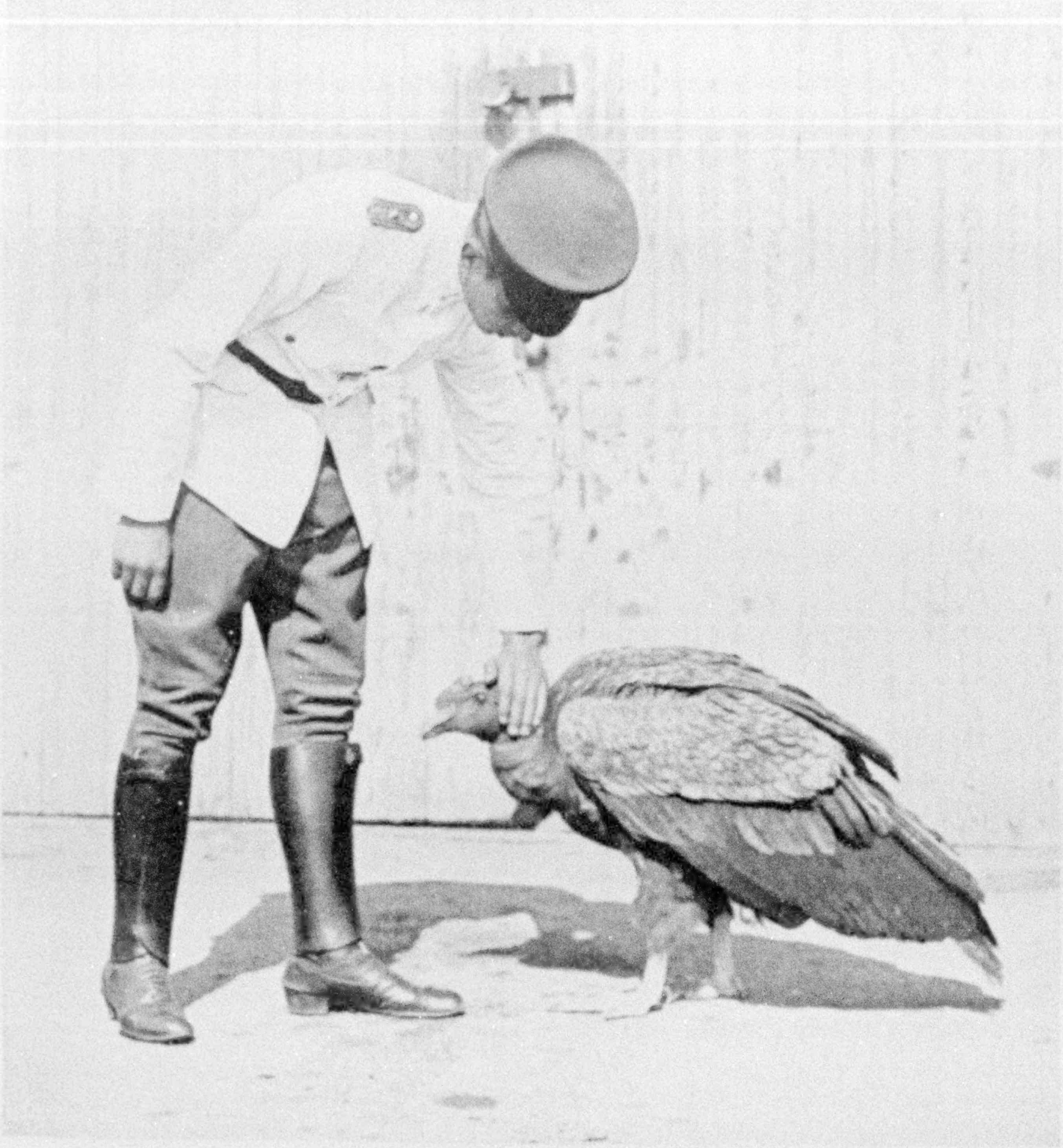
A CORNER OF THE MARKET: SANTIAGO

Chilean melons are unrivaled. Last season, fruit from Chile was marketed in New York, some of the melons, weighing seventeen pounds, selling for $6 each.

The men have forsaken native dress save back in the mountains, where a few still cling to the *chirapa*, or bloomers, evolved from a blanket wrapped round the legs and tucked through the belt, the same type of trousers formerly worn by the Argentine *gaucho*.

Mapuche customs, slowly dying out, are interesting. There is the hair-pulling contest among the boys. Standing face to face, each combatant grasps the long locks of his opponent and the game is on. The feat is to destroy your opponent's balance and bring him to the ground. Once down, there is no pommeling. The hold is loosened and the boys stand up and begin again. *Chueca*, the national Mapuche ball-game, played with clubs, is not unlike hockey.

Certain names among Christianized Mapuches and Chileans puzzle the traveler until he learns that, regardless of sex, a child is often named after the saint upon whose day it happens to be born. Thus a man may be called "Maria" and a woman "Pabla."



Photograph by Publishers' Photo Service

THE MASCOT OF THE REGIMENT

Condors are seldom tamed. Their home is in the azure above the towering Andes and on the highland crags. In this century the airplane crossing the Andes disputes the condor's domain.

Some of the Mapuche girls I met had names half Christian, half pagan, like little Maria Epuqui, who went to all the trouble of changing her gown on the sidewalk to have her picture taken. Her best clothes and shoes were in a bundle under her arm.

There are Catholic and Protestant missions among these Indians. The British missionary, who has lived here for twenty years, rides back into the wilderness and camps with his flock. "They are eager to learn Spanish," he told me, "better to cope with the Chileans and retain their allotted lands."

ARAUCANIAN BLOOD IN CHILEAN VEINS

The tragic history of this valiant forest tribe is told in "La Araucana," that epic of Ercilla's, the Spanish warrior-poet, who met these Indians on the battlefield in sixteenth-century wars. His mighty heroes, Caupolican and Lautaro, were real men. The one was put to

© Publishers' Photo Service

SOLDIERS AT SCHOOL

Military service is obligatory in Chile, a call being made on all males of twenty years. The strength of the active army is estimated at about 20,000; war strength, 300,000.

death by the Spaniards; the other caused the death of the Spanish conqueror, Pedro de Valdivia.

In the blood of the southern Chileans, save among a few aristocratic Spanish families, flows the strain of conqueror and conquered. The great round eyes of Chilean children, the features of the universally beautiful women, show Mapuche blood. As a pure-blooded stock, these Indians are doomed; but here there will be absorption rather than annihilation, and the splendid physique and valorous traits of this native people will not be lost to posterity.

In Hopi-Land, in Arizona, the Indians hold their annual prayer festival for rain. In Mapuche-Land they also have a traditional prayer feast; but here they pray for dry weather. The season of our visit there had been scarcely two consecutive rainless lays. We were under the weeping skies of Arauco.

In northern Chile they long for rain; in southern Chile, for sunshine. In the nitrate zone the total rainfall during the past twenty years has barely totaled one inch. For fourteen years not a drop fell. In Copiapó, 500 miles from the beginning of the Chilean desert, there is an average annual fall of three-quarters of an inch.

But if the north has "gone dry," the south is certainly wet. Here Jupiter Pluvius reigns. Vapor-laden winds from the Pacific meet winter-chilled earth. The winds, ascending the Andes, pass through Nature's wringer and are hurled back in torrents. Annual precipitation must be gauged in feet instead of inches. Sixteen feet, even eighteen feet, farther south, is the official record.

Our winter is the Chilean summer. If you plan a visit to rainiest Chile, go in December or January. Then the roads are in better condition.

WOODEN CLOGS REPLACE RUBBERS

Saddle travel is popular. Ox-teams drag carts over the muddiest of roads. The carts have wooden wheels, like the chariots of the Romans, and their creaking is heard from afar. In more settled regions, corduroy roads have been con-

© Publishers' Photo Service

GROWING HEMP IN THE ACONCAGUA VALLEY

While not one of the leading products, hemp is successfully grown in Chile. Last season 2,700 tons of hemp fiber were produced and an equal amount of seed. This seed is a favorite food for poultry and cage-birds. In 1832 the Chilean Government offered, as an inducement to all who would plant hemp, an exemption from taxation for ten years.

structed; but the roads on the frontier are so bad for many months of the year that an American friend of mine, whose husband has a cattle ranch and lumber camp in the mountains, is actually marooned during the long wet season. Because of the mud, people south of the Bio-Bio wear wooden clogs over their boots, as we wear rubbers.

But rain or no rain, mud or no mud, the traveler who fails to visit southern Chile misses one of the New World wonderlands. There is an almost continuous forest from the Bio-Bio to the "jumping-off place" at Puerto Montt. In this forest are many lakes and clear grass-bordered rivers. Lumbering is the important industry. Sawed timber is piled high at the railroad stations.

In the days when Darwin voyaged to Chile, pine boards passed for currency in the southern ports. The Indians brought

Photograph from Harriet Chalmers Adams

A CHILEAN RANCHER IS A KING IN HIS OWN DOMAIN

His great country-house, where scores of town guests are often entertained at week-ends, is set in the shade of Lombardy poplars, well back from the road.

them out on their backs from the depths of the dripping forest.

Of Chilean trees, I like best the Araucaria pine, with its tall, branchless trunk and umbrella-like top. It has a relative in Brazil and Paraguay. The Mapuches gather the seeds from its cones.

"Why do you import so much Douglas fir from America, when you have such splendid forests?" I asked a Chilean fellow-traveler. He launched into a discourse on the wonders of the Chilean forest.

"We *do* produce lumber," he said, "lots of it, almost half of what is used in the country. That pile we just passed was 'lingue,' used for furniture. Those gigantic pines are 'alerce.' Some grow 120 feet high and 15 feet in diameter. It's about the largest pine in the Americas! . . . That big tree is the 'coihue.' Its wood can be used for paper-making, and there are millions of them in the forest."

The *copihue,* national flower of Chile, glorifies the woods. It is the bell-shaped bloom of a vine which festoons the trees—

Photograph by Harriet Chalmers Adams

SELLING CHILE'S NATIONAL FLOWER

The copihue is the bell-shaped bloom of a vine which festoons the southern woods—red-rose, rose, pink, and white in color. A famous horticulturist has said: "All in all, the copihue is the most beautiful flower which the earth has produced." The Bureau of Plant Industry, U. S. Department of Agriculture, is now raising the copihue, and before many years this lovely flower will be known throughout the country.

red-rose, rose, pink, and white in color. Boys and girls gather great armfuls of these lovely flowers and sell them at the railroad stations.

THE LAND OF WILD BERRIES

This is the land of wild berries. Here the strawberry is native. In 1715 a Frenchman carried the first Chilean strawberries to Marseilles and cultivation in Europe began. Later this berry, superior to our variety, was brought to the United States. Blackberries grow so luxuriantly that they are considered a pest.

"You brought them to us from North America," a Chilean acquaintance told me, "but we'll have to forgive you, because you gave us, also, the California quail."

I had not expected to find quail here, or flocks of shimmering parrots, so far south. Back in the woodland depths hides the mysterious *huemul*, the shy, diminutive Chilean deer. Wild cattle roam the highland gorges of these southern Andes.

THE GERMAN COLONISTS IN SOUTHERN CHILE

We revisited a number of prosperous South Chilean German colonies which we had known in former years. The first of these colonists, eight families in all, arrived in the port of Valdivia in 1846. There are now about 30,000 people of German stock in the country, mostly between Valdivia and Puerto Montt.

The towns of La Unión and Osorno show marked German influence, while Puerto Varas, on the shore of lovely Lake Llanquihue, is a typical Teuton village. I passed many groups of tow-headed school-children with knapsacks on their backs.

These people have greater solidarity than any other foreign racial group. Their Chileanization seems to consist of learning Spanish and wearing the poncho in place of the mackintosh. Their children are taught to revere the fatherland.

As dairymen, fruit-growers, and lumbermen, these colonists are most successful. Almost every family takes summer boarders. Each place has its waddling geese, its cool, trellised beer-garden.

The Krupp concession in southern Chile, much talked of last year, is not materializing. This concession, granted two individuals on behalf of the Krupp Company, gave them the right for 30 years—the lease renewable at the expiration of that time—to 346,000 acres of forest land, with underlying coal-beds. A branch of the Krupp iron and steel industry was to have been established. Previous water-

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rights granted Chileans, and other legal knots, seem to have blighted the scheme.

IN THE NEW WORLD SWITZERLAND

At Puerto Varas we left the railway for a side trip, via the lake route, across the southern Andes. This is one of the loveliest regions I have ever visited. The Chileans call it the New World Switzerland. There is a chain of four lakes, two on either side of the continental divide, with wooded stretches between.

The first lake, Llanquihue (a Mapuche name), is an ultra-marine sheet of water, with forest-encircled shores. From Puerto Varas we steamed across the lake toward Mount Osorno. Osorno is one of the noblest mountains in the entire Andean range—isolated, conical, snow-draped, not unlike Nippon's sacred Fuji.

The journey from Lake Llanquihue to the second lake, Todos los Santos (All Saints), is made by automobile during the summer; by coach when the roads are very muddy. We made it in the saddle, always our favorite mode of transportation, through enchanting woods, now rich in nuts and wild berries, across grassy flower-strewn fields, beside the merry little Petrohué River.

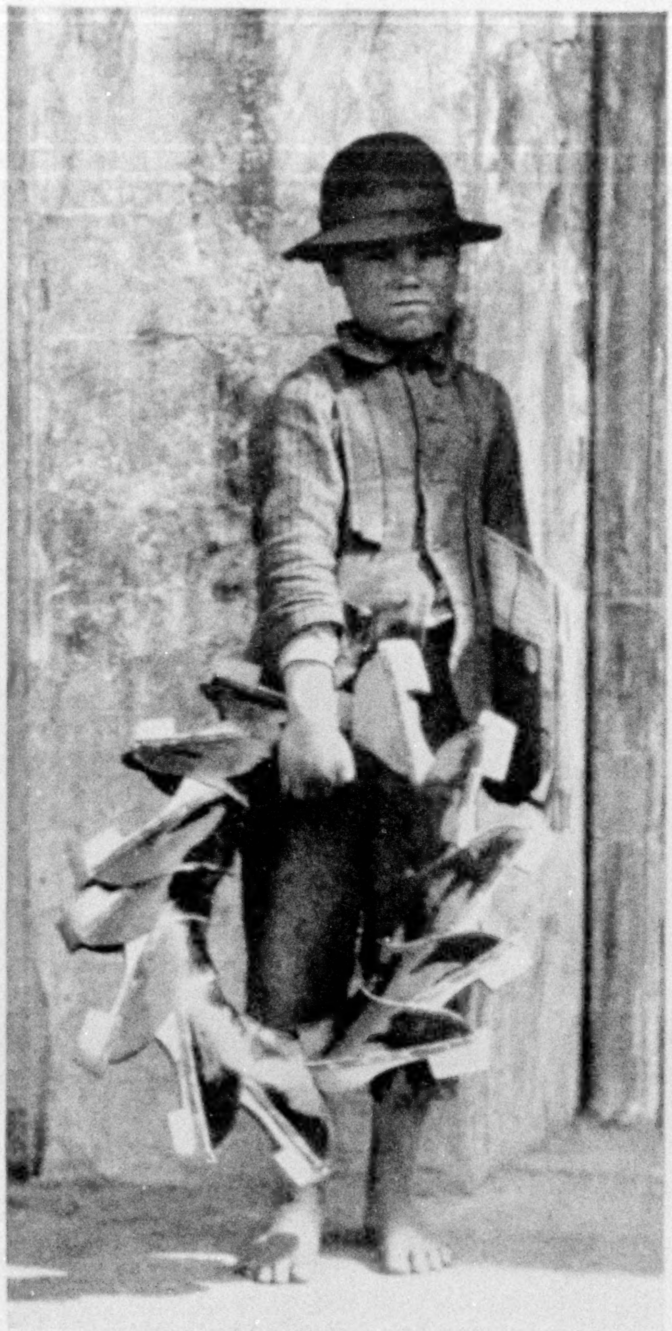
Lake Todos los Santos is just at Mount Osorno's feet, emerald green, with heavily wooded shores showing few habitations. A second boat ride of several hours brought us, at the end of the first day's journey, to the Swiss inn at Peulla.

The second day's journey is over the Andean pass, here only 3,445 feet above sea-level, to little Lake Frias, in Argentina, and on to big Lake Nahuel-Huapi.

From the town of San Carlos de Bariloche, on the shore of the last-named lake, the journey can be continued by automobile and rail to Buenos Aires. Many Argentines and Chileans cross the continent by this route in the summer time.

The Argentine lake region has already been made a national park, and in time the Chilean side will be improved with metaled highways, so that automobiles may be used all the year round. No other transcontinental route south of Peru can boast of such magnificent scenery.

Returning to Puerto Varas, we continued on to Puerto Montt, on the Gulf of Ancud, where the longitudinal railway ends. The only Chilean railroads south of this point are the line which connects the towns of Ancud and Castro, on the Island of Chiloé, and a privately owned stretch of rail near Punta Arenas.



Photograph by Harriet Chalmers Adams

WOODEN CLOGS IN PLACE OF RUBBERS

Southern Chile is one of the rainiest sections of the world. On the muddy roads wooden clogs are worn over the shoes in place of rubbers. This little fellow is selling overshoes at the railroad station in Temuco.

ANCUD SEAT OF A SHELL-FISH INDUSTRY

Backed by evergreen hills, facing a crescent shore, lies the pretty little town of Puerto Montt, a busy port of southern Chile. From here steamers sail through the inland passage, that maze of archipelagoes, to the Strait of Magellan and

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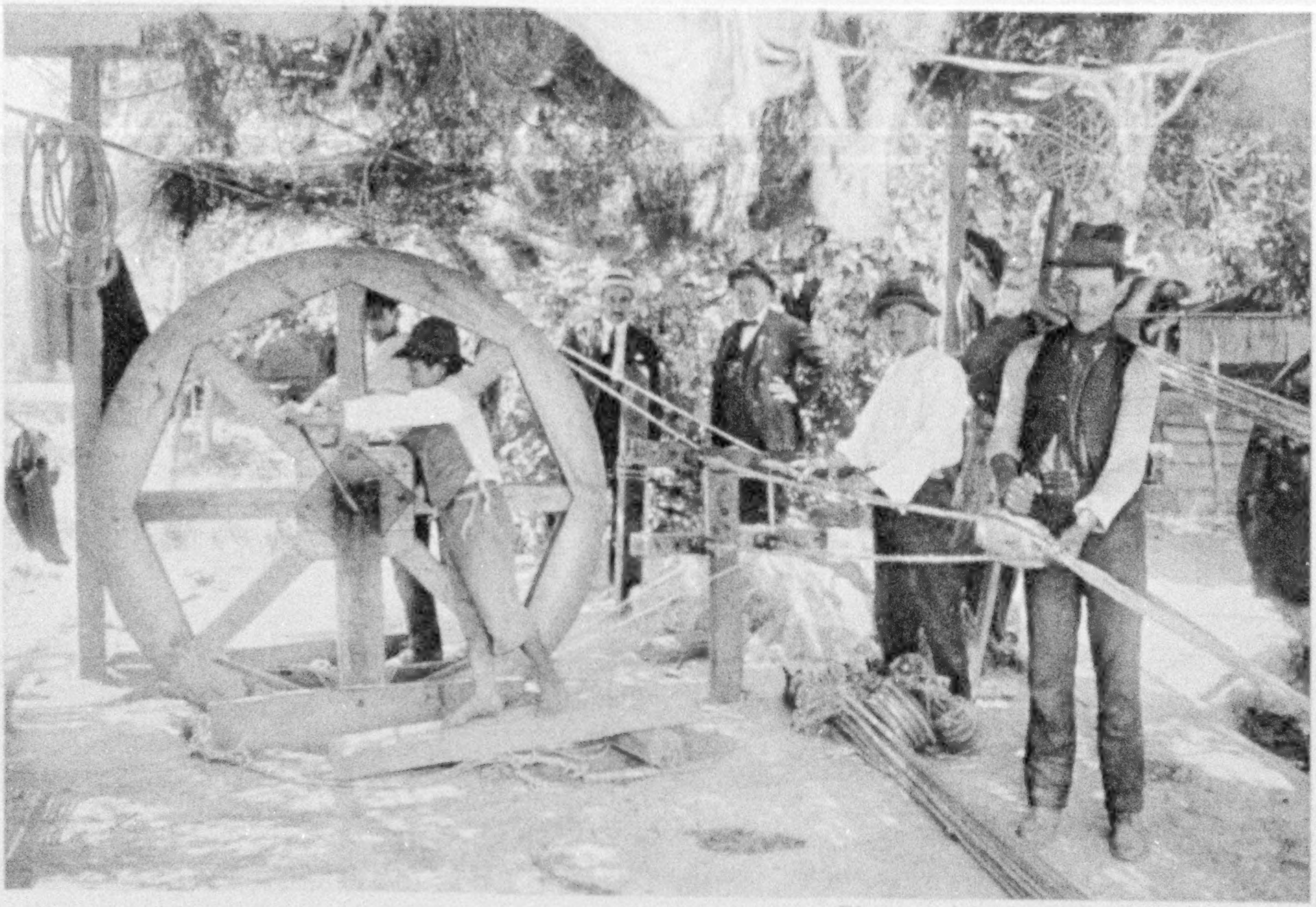

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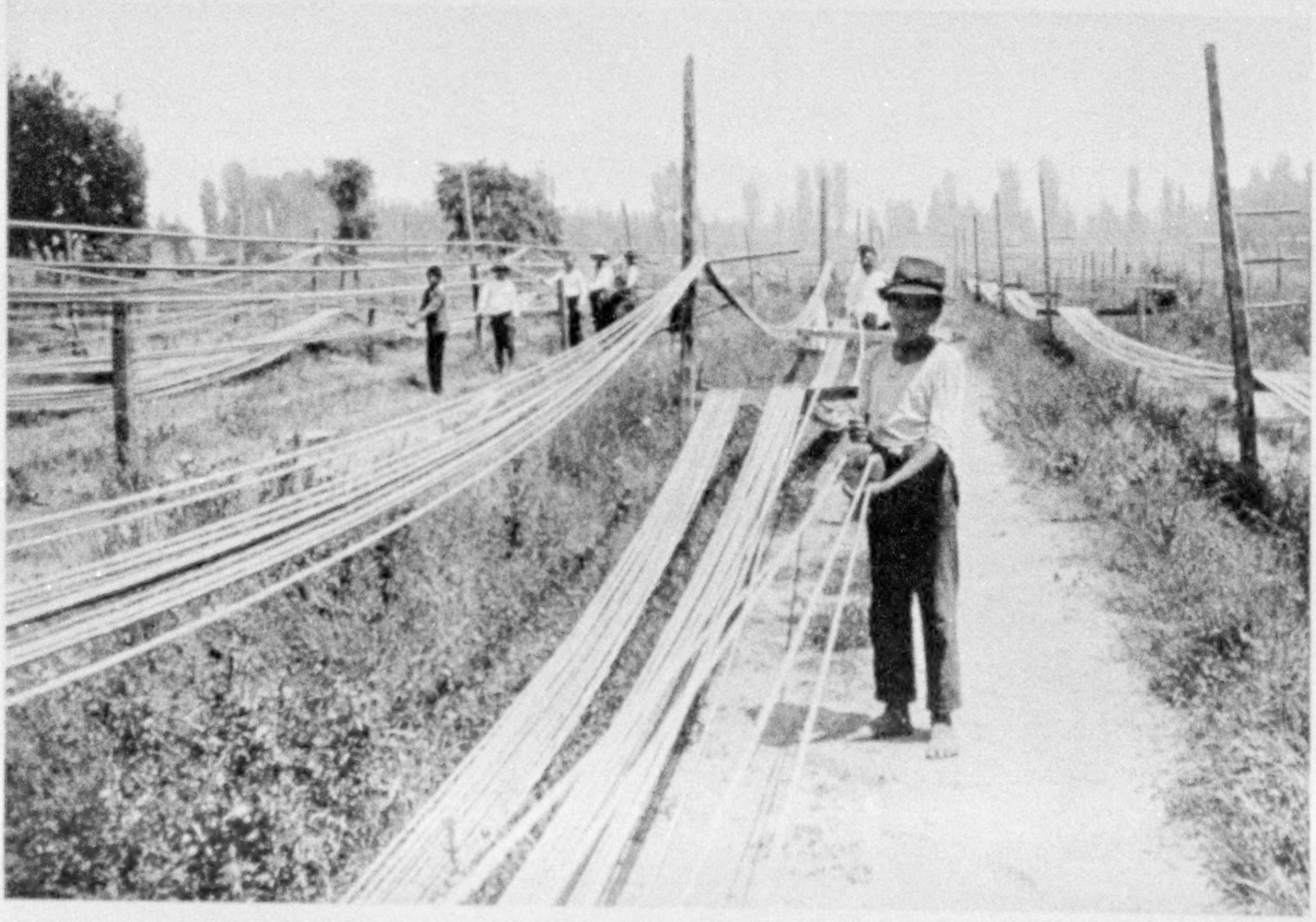
MAKING ROPE FROM HEMP FIBER

The hemp fiber from which the rope is made is obtained from the inner bark of the stalk.



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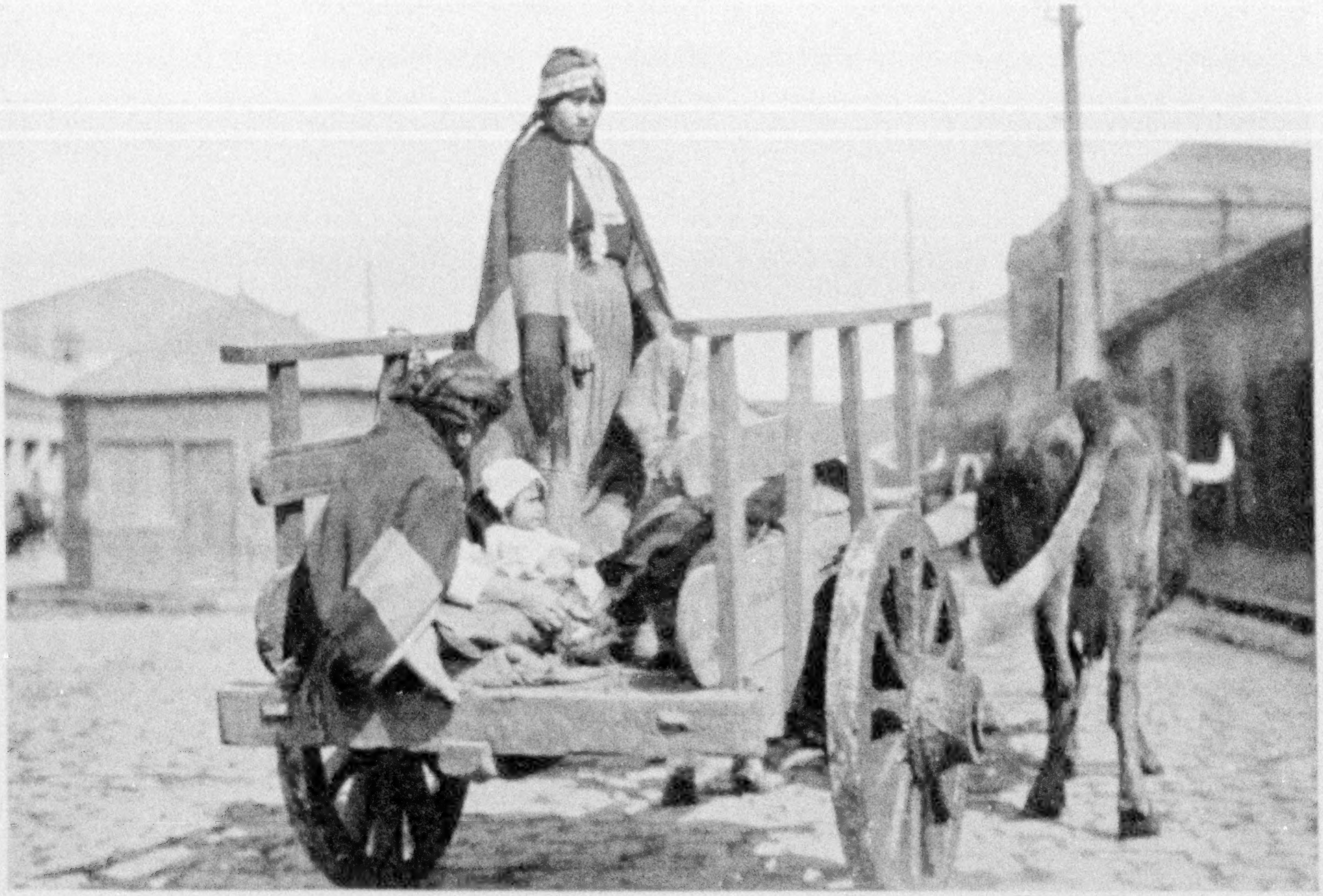
A PRIMITIVE ROPE-WALK IN LOS ANDES



Photograph by Harriet Chalmers Adams

IN FROM THE COUNTRY

The town of Temuco is in the heart of the Araucanian region. Here the roads are muddy most of the year, owing to the excessive rainfall, and ox-cart travel is the chief mode of transportation. These Indians raise wheat, corn, potatoes, and apples. Their fellows in the mountains to the east raise cattle and sheep. The men have adopted the Chilean costume, but the women cling to the dress of their grandmothers.

into the innumerable fjords that here cleave the ragged mainland. We boarded a decidedly ill-kept little boat bound for Ancud, on the Island of Chiloé.

Ancud, a galvanized-iron town fairly reeking of the sea, is the seat of the shell-fish industry. Here clams, mussels, and shrimps are canned for export and oysters-in-the-shell shipped to Valparaiso.

Wheat and fruit do not thrive in this moist climate, but potatoes form an important article of export, 200,000 sacks being shipped the season of our visit. I found Chiloé's autumn climate very damp.

Here I ate my first supper of cooked seaweed, which is not unpalatable. I was interested in the little Chilote pony, wiry, with great endurance, years of isolation having here developed a peculiar equine type.

CHILE'S UNEXPLORED REGIONS

It is five hours by rail from Ancud to Castro, the last Chilean town of any importance until Punta Arenas is reached.

The unexplored portion of Chile lies along the Andean range, in the provinces of Llanquihue and Magallanes. In 1783 a Spanish priest, Fray Francisco Menendez, explored and mapped a great portion of the wild region east and southeast of the Island of Chiloé. His long-neglected diary was some years ago published in Chile, and modern explorers found they had followed the intrepid friar's century-old trail. I have a copy of this fascinating diary.

Last year an Argentine expedition, accompanied by several eminent Chilean scientists, explored the unknown region lying between latitudes 46° and 47°. An exhaustive study was made of glaciers and flora on the Isthmus of Ofqui. Lake Buenos Aires, one of a long chain of lakes on this southern borderland, surpasses in size all other South American lakes save Titicaca.

The Chilean Government is considering the cutting of a canal through the Peninsula of Taitao, which will save steamers

Photograph by Harriet Chalmers Adams

AN ARAUCANIAN MOTHER

These women have powerful physiques and strong features, reminding one of the Maoris. After their children, massive silver ornaments, such as this woman displays, are their dearest possessions. They sometimes pawn, but seldom sell, these treasures.

bound along the inland waterway from navigating the open sea. South of Taitao the scenery changes. The islands terminate in abrupt cliffs and glaciers come to the sea. Even at this great distance from the Equator, the trees are evergreen and the temperature rarely falls below zero.

AT THE STRAIT OF MAGELLAN

We came, at last, in our voyaging to that winding, river-like channel, that cleft in the Andes which the great Portuguese navigator, in the service of Spain, discovered in 1520. To the north lay the South American mainland; to the south the Fuegian archipelago. I see still those majestic cliffs shading from gray into violet; those mysterious glaciers slipping into a leaden sea; those storm-petrels winging their way overhead!

These western reaches of the Strait of Magellan are treacherous. The Pacific is misnamed. Mariners usually find a gale off Cape Pilar. Punta Arenas has been the goal of many a missing ship.

If you will consult the map (see page 223), you will see that practically all but one of the islands south of the Strait belong to Chile. The largest island of the group is divided between Chile and Argentina.

PUNTA ARENAS PROSPERITY BASED ON SHEEP

The Chilean city of Punta Arenas, on the mainland facing the Strait, is the metropolis of this region; but the Argentine town of Ushuaia, in Tierra del Fuego, is the southernmost permanent settlement in the world.

From Cape Pilar to Punta Arenas we looked on a virgin country—huge masses of rock, a land suited neither to agriculturist nor shepherd; but from Punta Arenas on to the Chilean boundary, both sides of the Strait are well adapted to agriculture.

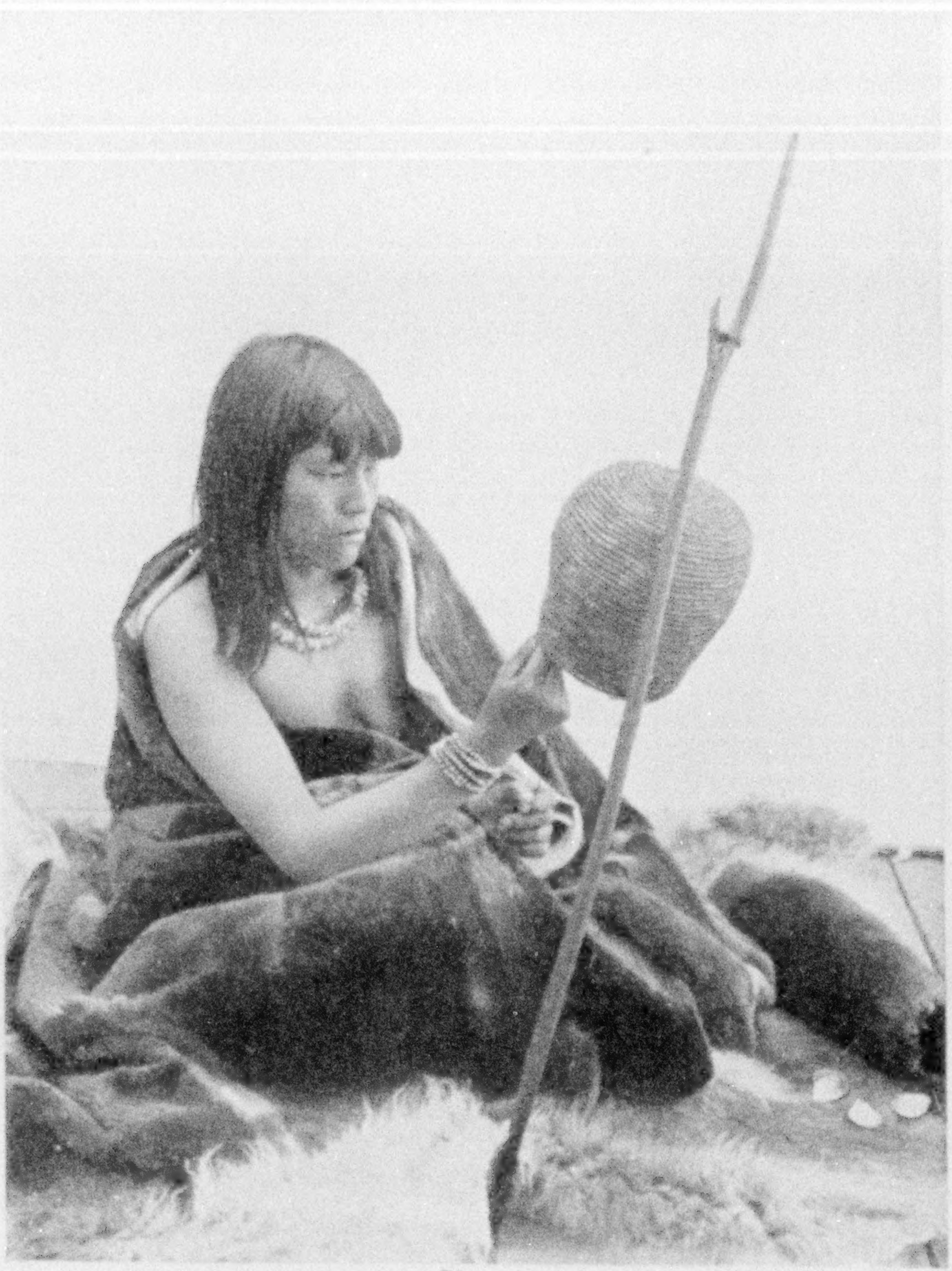
For its population, which is about 24,000, Punta Arenas is the most commercially successful of all Chilean cities. It owes its recent prosperity to the growth of the sheep industry. Exports to the

United States last season totaled $12,000,000. There was also a considerable export of frozen mutton to Great Britain.

The earliest navigators passed this point, and Sarmiento's band, settling here in the sixteenth century, died of starvation. On the site of old Port Famine the Chilean flag was planted in 1843. Yankee sailors and whalers dubbed the forlorn penal colony "Sandy Point" (Punta Arenas), and the name survived.

In the sixties the first steamship line between Valparaiso and Liverpool was inaugurated, and Punta Arenas, the most isolated port in South America, came into importance. It is 1,100 miles from Bahia Blanca, the nearest big port on the Atlantic, and 1,200 miles from Talcahuano, on the west coast.

At the time of our first visit, in 1904, Punta Arenas was an unpretentious little town of galvanized-iron roofs. I was struck with the total lack of verdure; the terrific wind-with-an-evil-twist, which threatened to blow one across the Strait, right on down to Cape Horn.



Photograph from Harriet Chalmers Adams

ONE OF A PASSING RACE

During the last years of the nineteenth century and the first fifteen years of this century, the Fuegian Indians, of three different tribes, steadily decreased and are now practically exterminated. This is an Ona woman, weaver of baskets. Tuberculosis and kindred ills of civilization, along with the sheepherder's deadly rifle, put an end to her tribe (see text, page 273).

Whenever the bell at the end of the long pier tolled, there was great excitement. It heralded the coming of a steamer. Out rushed the cosmopolitan inhabitants of this "tail-end" city, eager for news from home.

Telegraph and wireless finally brought this region, so long cut off by sea and impassable tracts of uncultivated country, in touch with the rest of Chile.

The Panama Canal struck Punta Arenas a hard blow. Trade was diverted. But, in spite of its waning importance as a port of call, the city continued to thrive.

AN IMPORTANT FUR MARKET

Turning its eyes from sea to earth, it grew to value its surrounding grazing lands. Sheep ranches multiplied. Motor roads stretched out toward the Argentine pampa; a steadily increasing fleet of small vessels sailed into the Fuegian channels.

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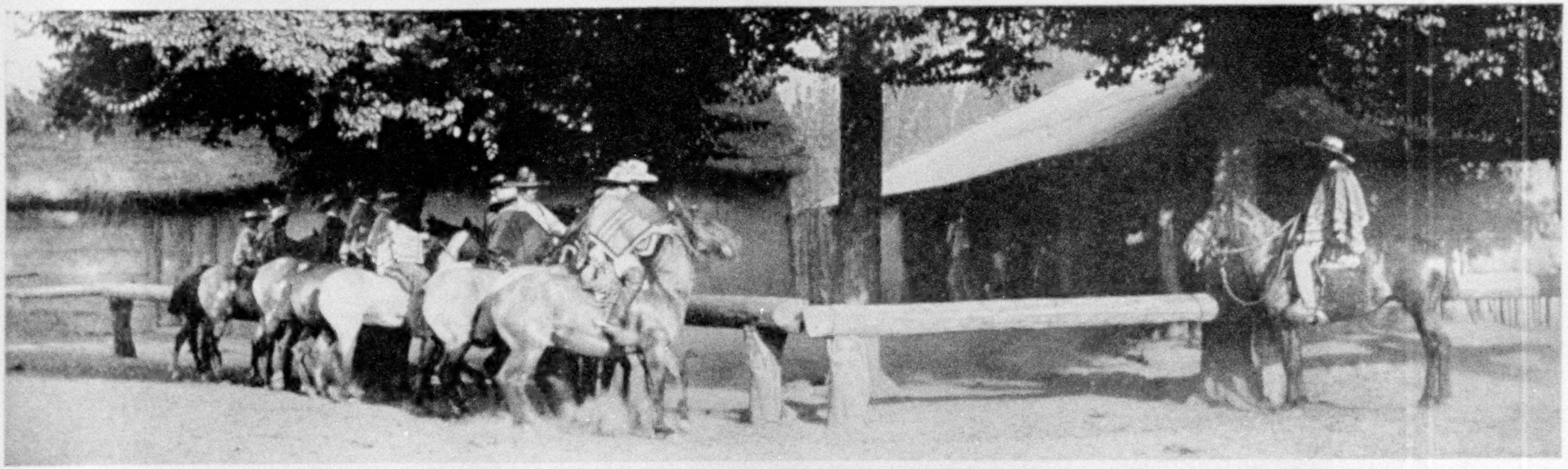
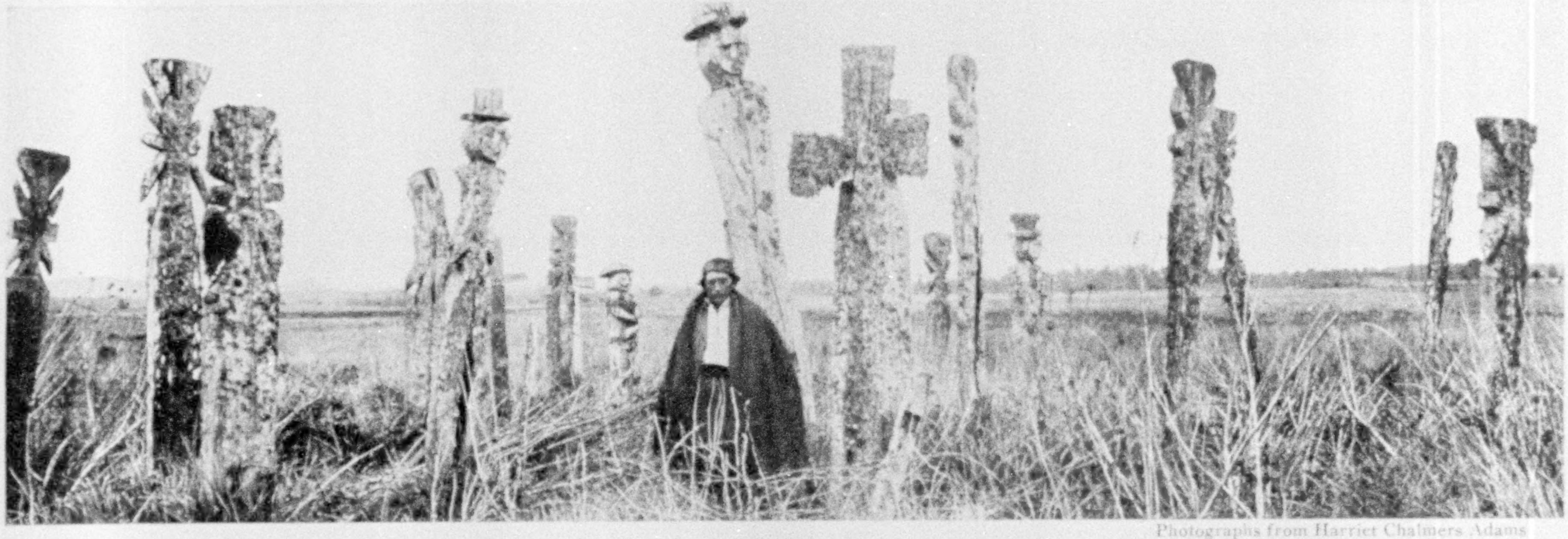


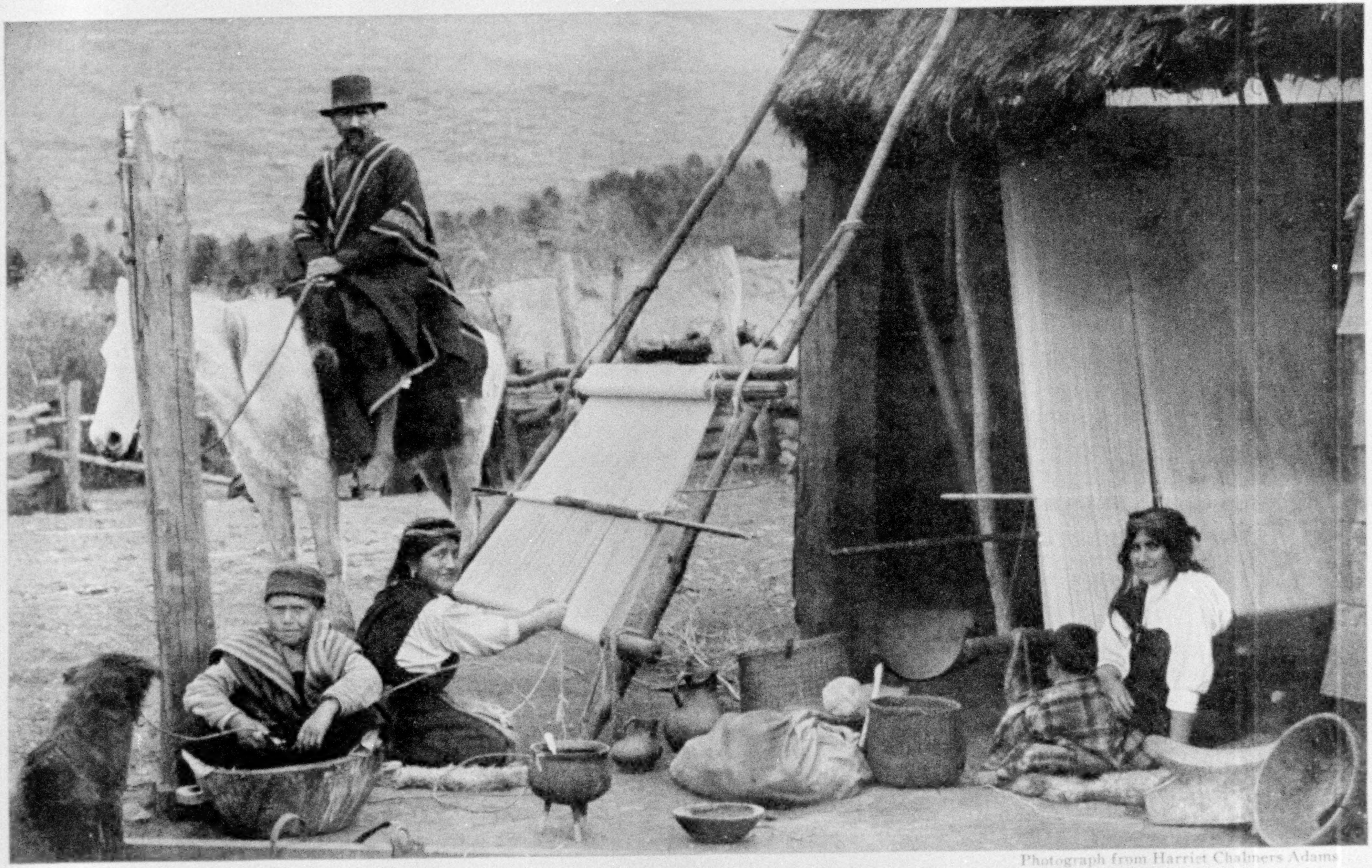
THE ANCIENT GAME OF TOPIO, POPULAR IN CENTRAL CHILE (SEE TEXT, PAGE 248)



Photographs from Harriet Chalmers Adams

AN ARAUCANIAN GRAVEYARD

The wooden images, crowned with tall hats, remind one of those mammoth head-covered stone images found on Easter Island.



Photograph from Harriet Chalmers Adams

AN ARAUCANIAN HOME, SOUTHERN CHILE

There remain 100,000 Araucanian Indians in Chile, the most valorous of all South American aborigines, for centuries unconquered by Inca, Spaniard, or Chilean. They call themselves "Mapuche," which means "people of the country." The Mapuche learned weaving from the Incas of Peru, who tried to conquer them. Prior to that period they wore guanaco-skin garments (see text, page 249).

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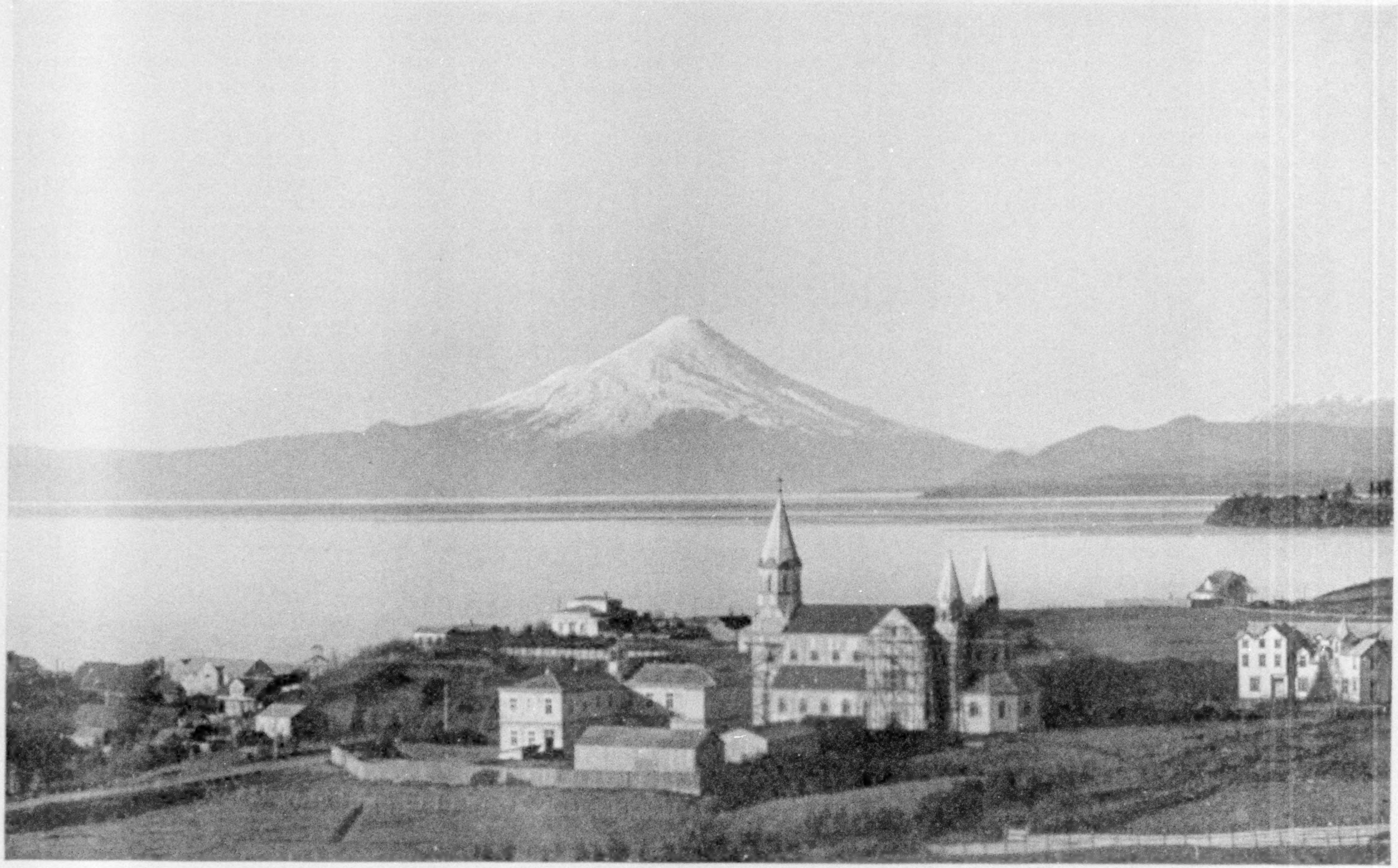
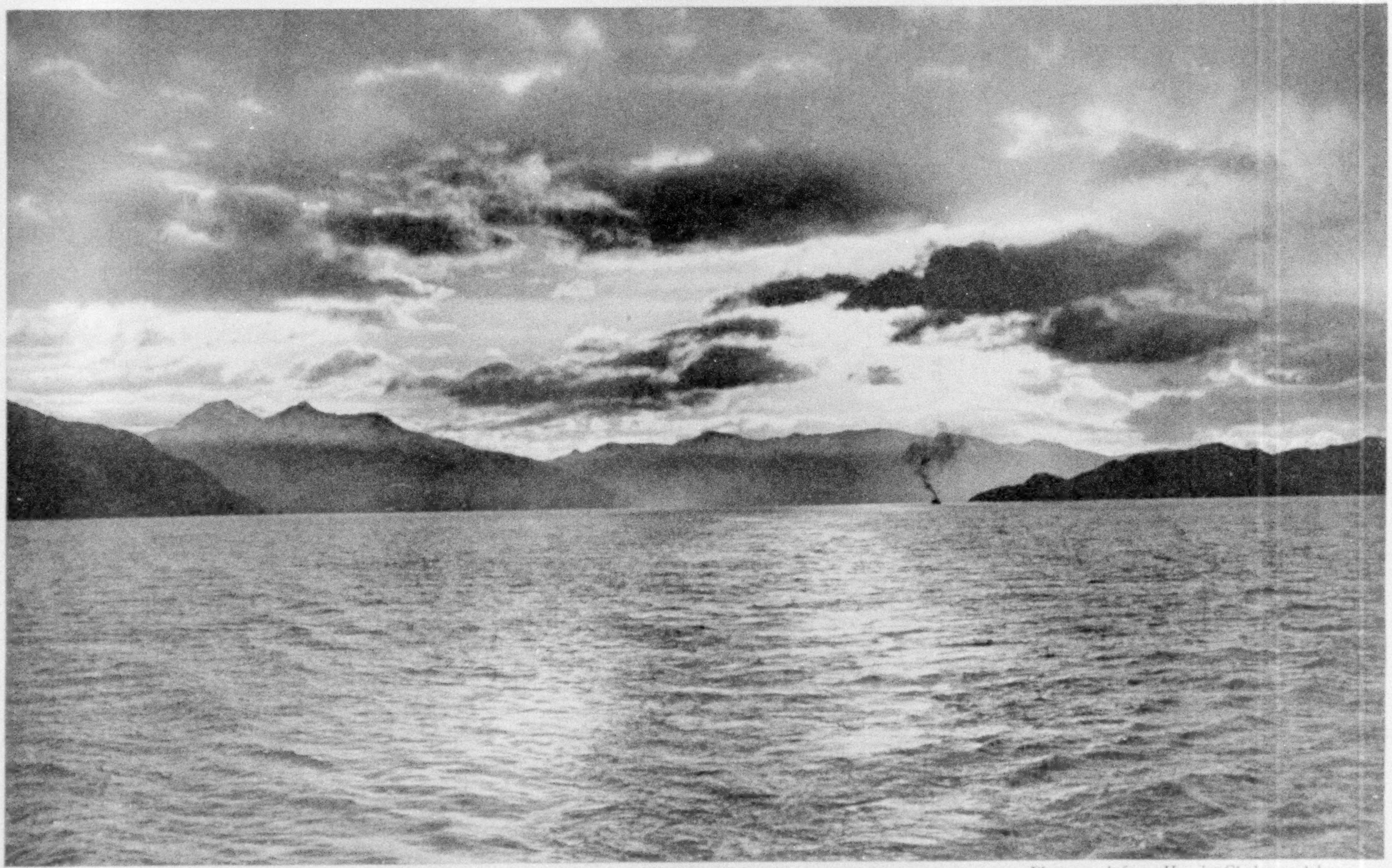


Photograph from Harriet Chalmers Adams

PUERTO VARAS, A GERMAN SETTLEMENT ON LAKE LLANQUIHUE

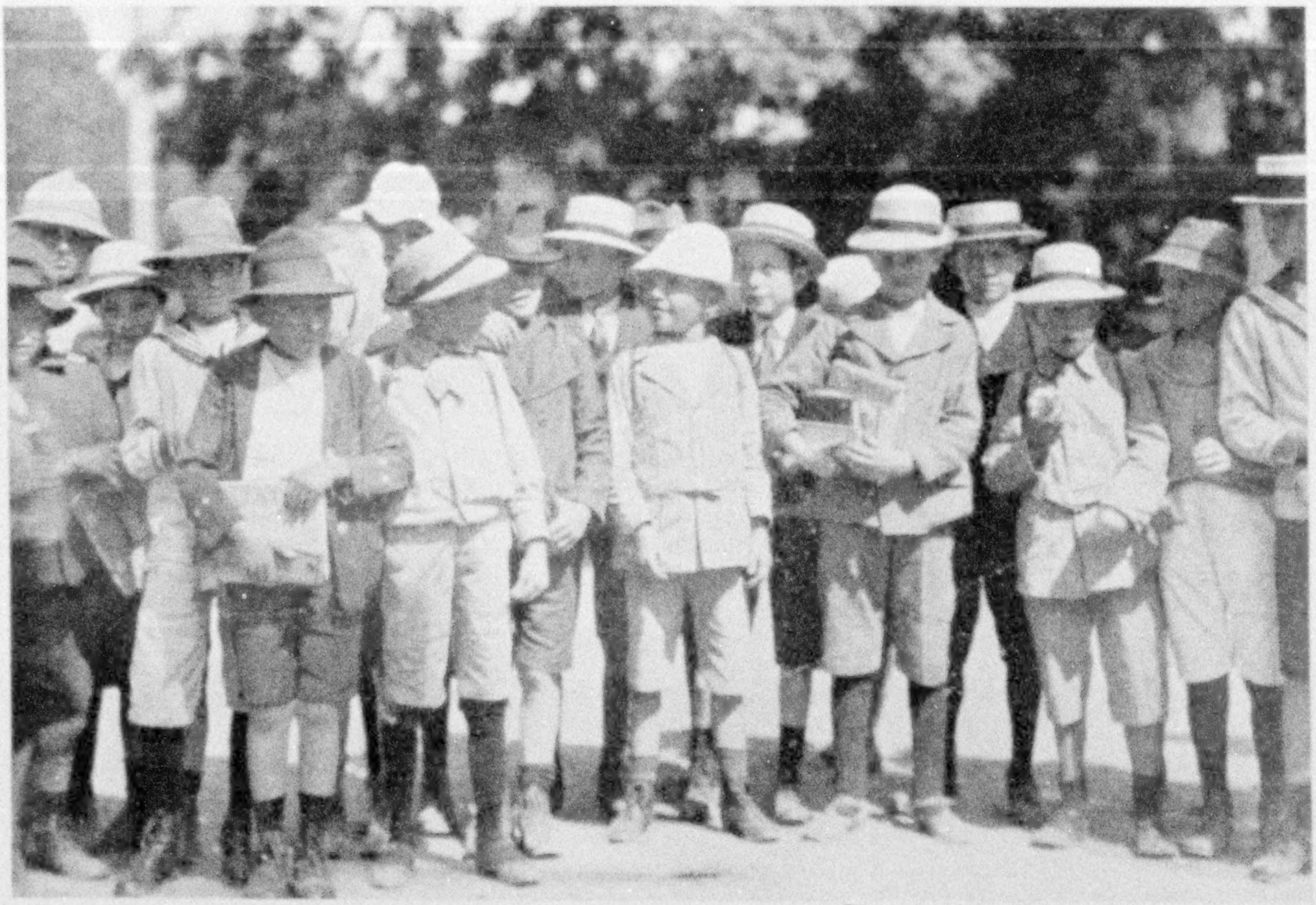
This is one of a number of thriving German settlements of southern Chile. Across the lake rises Mount Osorno, rival in beauty of Nippon's sacred Fuji. This snow-clad monarch rises from the second of a chain of lakes extending across to Argentina.



Photograph from Harriet Chalmers Adams

THE STRAIT OF MAGELLAN

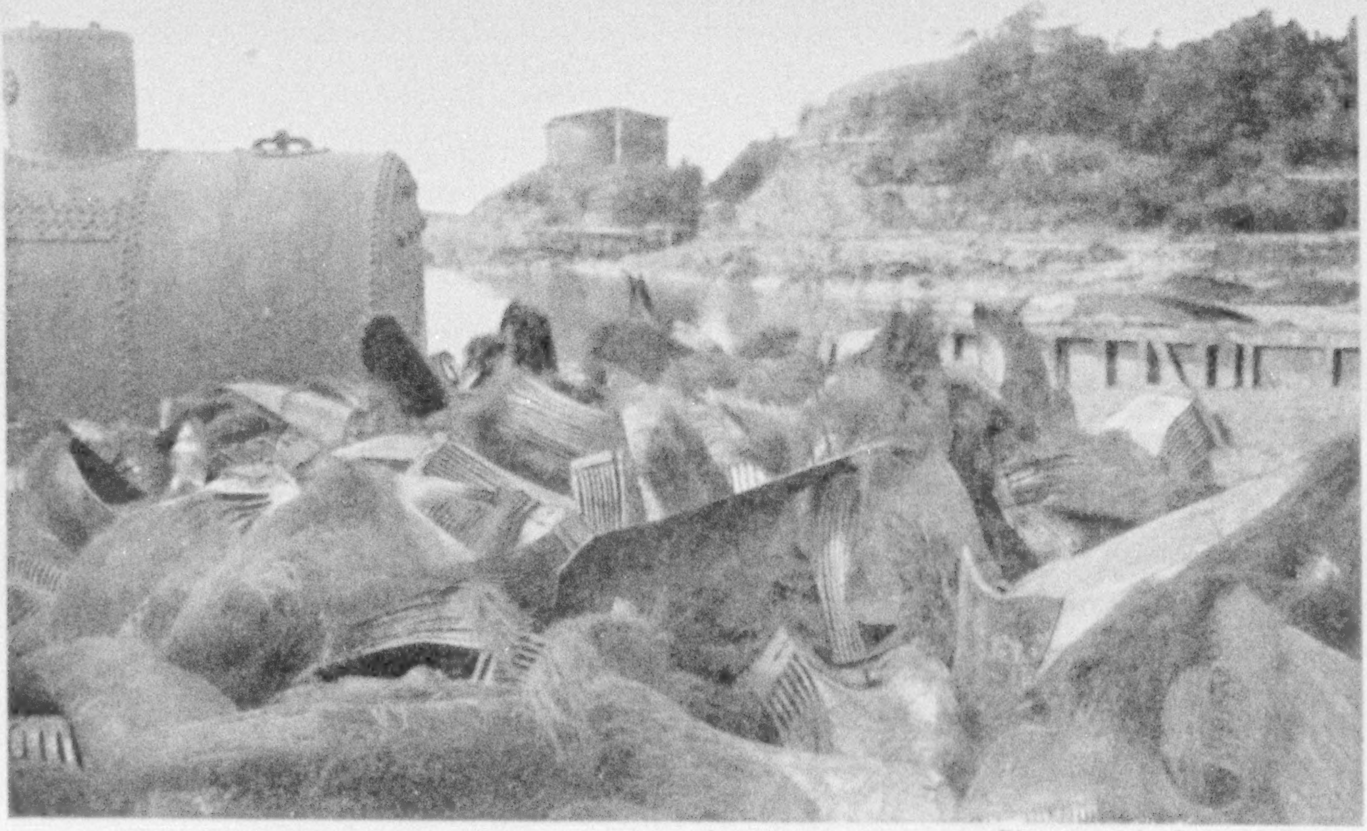
On one shore, the end of the South American mainland; on the other, little-known Tierra del Fuego, whose unique pasture-lands support 2,000,000 heavily fleeced sheep. The western entrance to this channel has been the grave of many mariners, so treacherous are its waters.



Photograph by Harriet Chalmers Adams

SCHOOLBOYS OF OSORNO, IN THE HEART OF A GERMAN COLONY OF CHILE

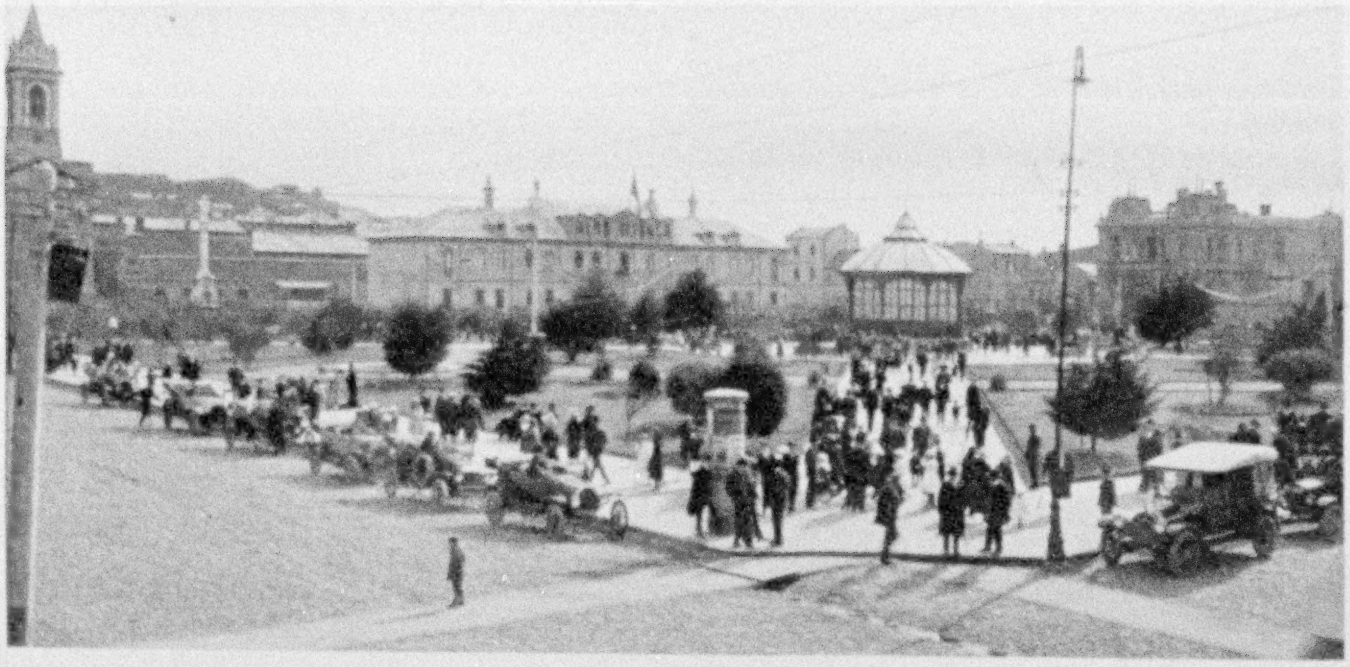
In Osorno, as in other Chilean towns populated by Germans, the children are taught German as well as Spanish.



Photograph by Rollo H. Beck

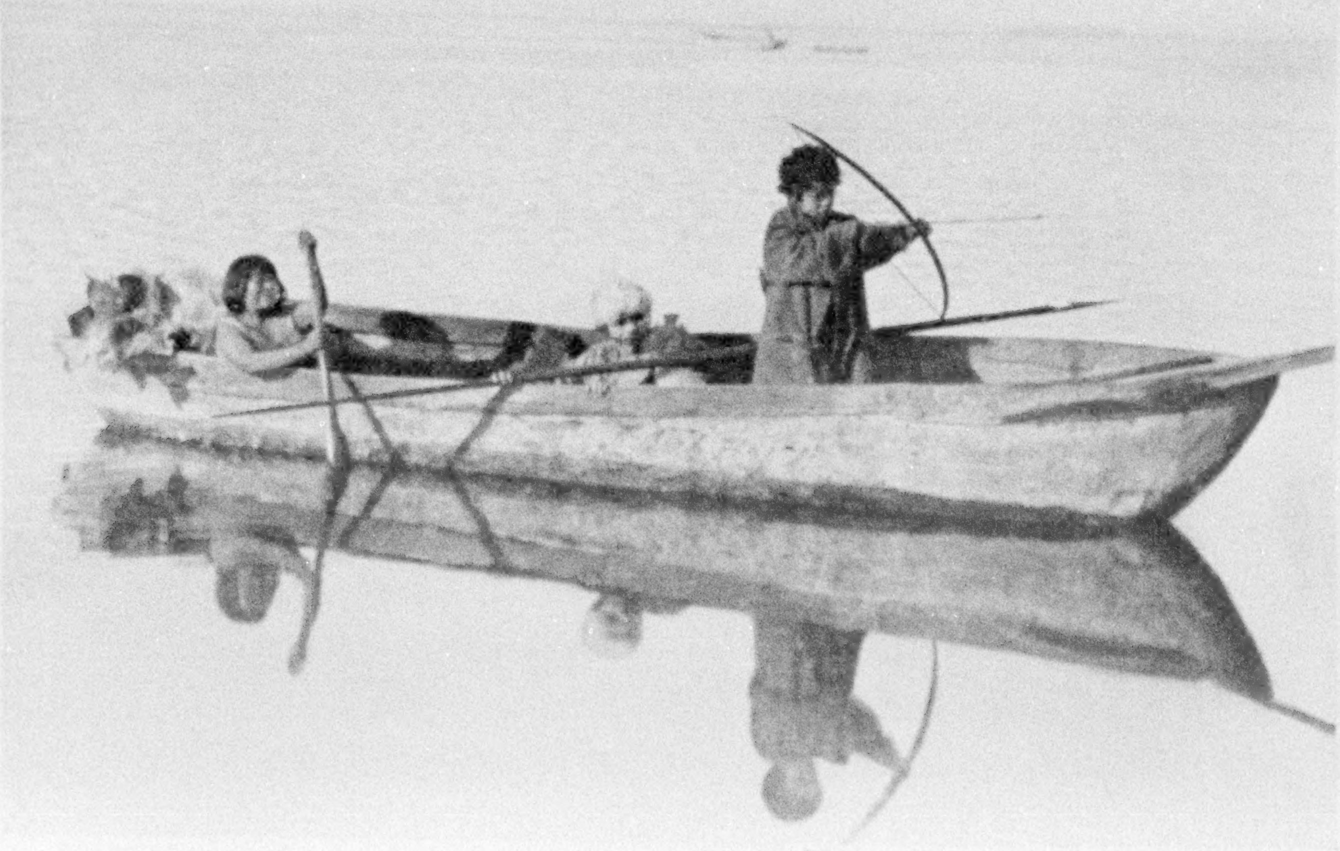
WHALEBONE ON THE SHORE NEAR CORRAL

Whaling is an industry of southern Chile. It shows indications of increasing importance. One company captured more than 400 whales last season. These great mammals of the deep are said to come nearer the shore here than in other parts of the world.



PUNTA ARENAS, ON THE STRAIT OF MAGELLAN

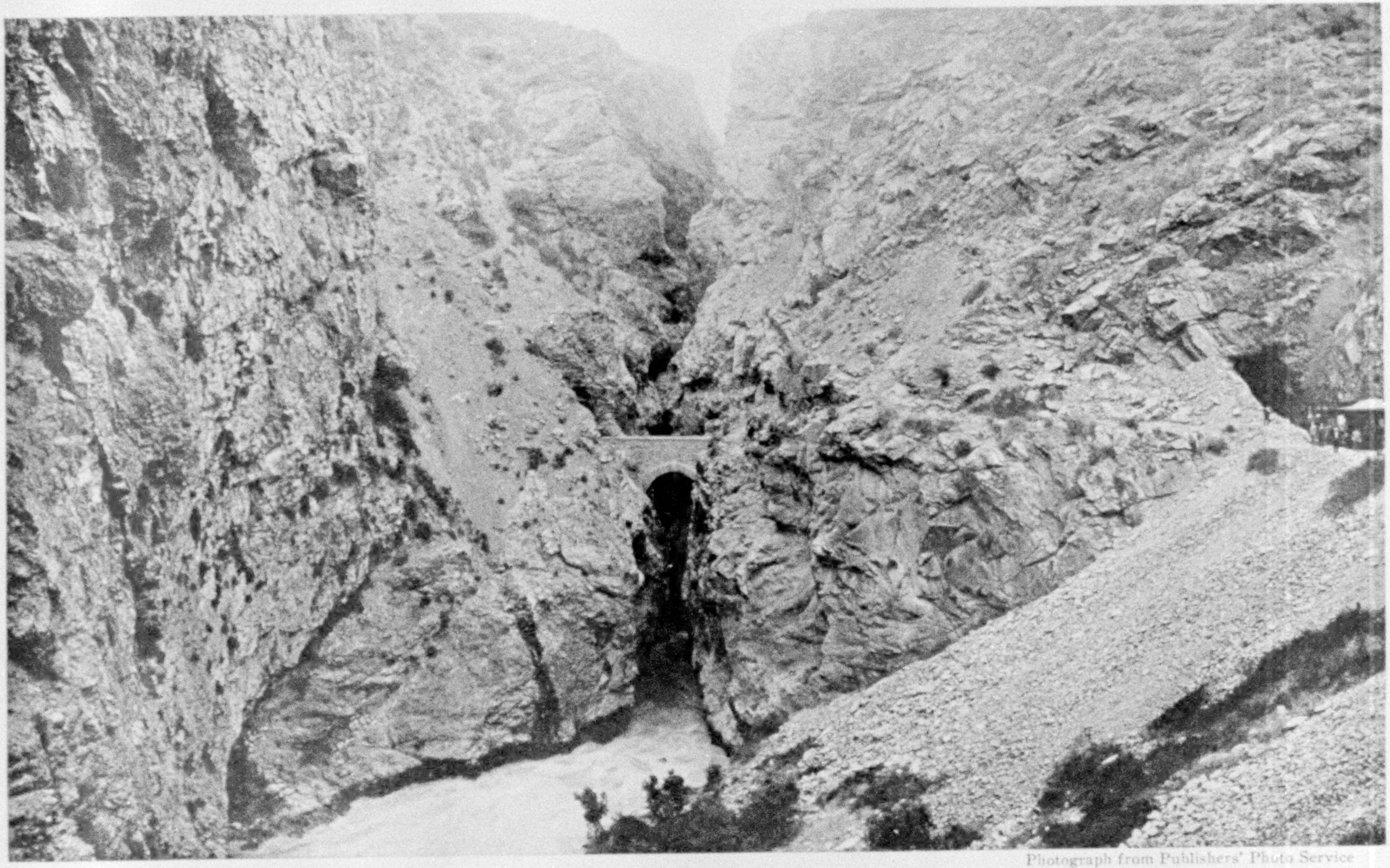
Punta Arenas (Sandy Point), metropolis of the Strait of Magellan region, is on the mainland, facing Tierra del Fuego.



Photographs from Harriet Chalmers Adams

THEY GAVE TIERRA DEL FUEGO ITS NAME

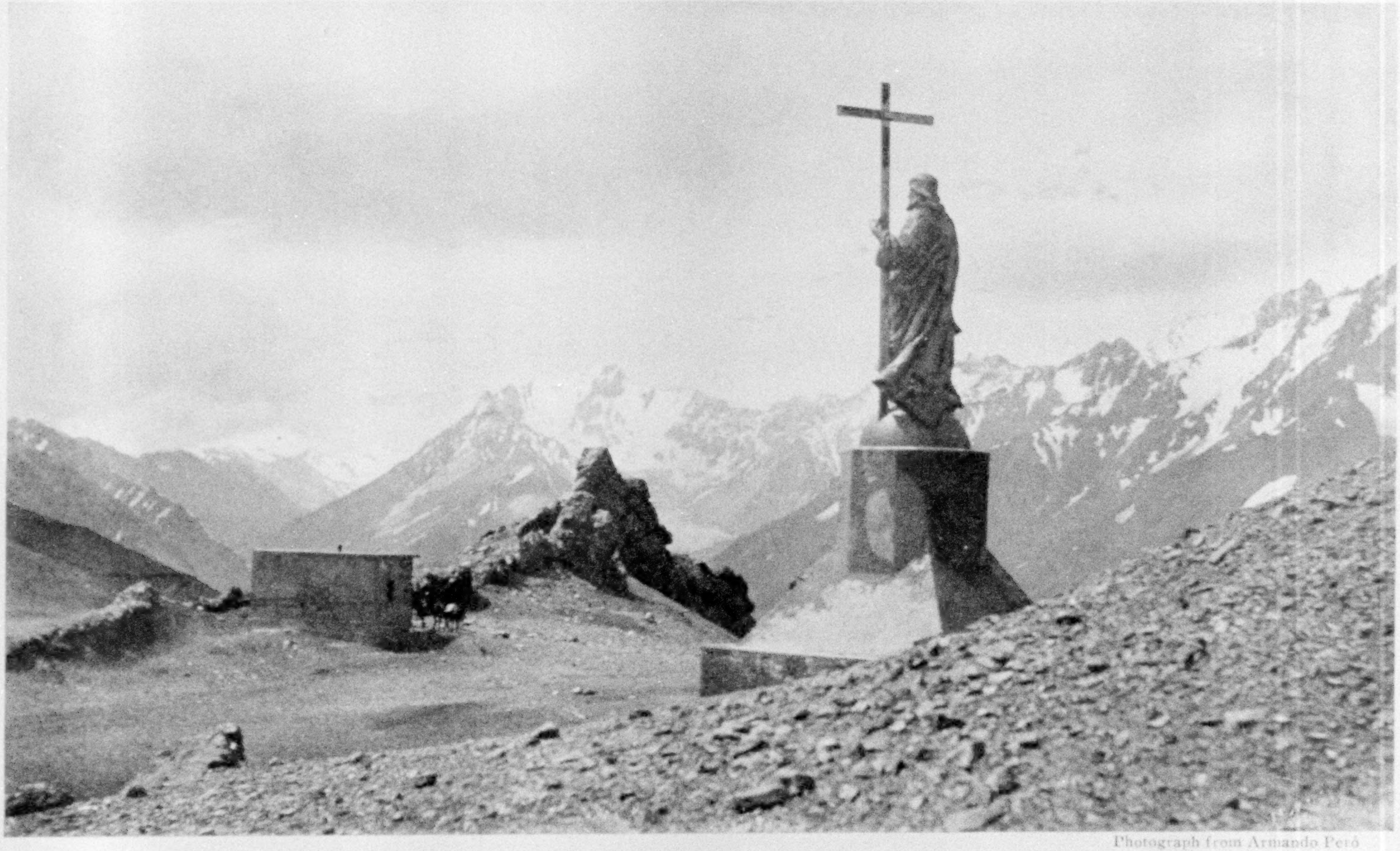
It was the smoke from the campfires of the nomadic Alacaluf Indians that caused their region to be called "Tierra del Fuego" (Land of Fire). The Alacalufs, now practically extinct, wear guanaco-skin garments and anoint their bodies with fish-oil to keep out the cold.



Photograph from Publishers' Photo Service

A TUNNEL ON THE TRANSANDINE RAILWAY

The traveler crossing from Valparaiso to Buenos Aires is carried through one two-mile and many lesser tunnels which pierce the great Andean wall. During the winter months avalanches often block the track.

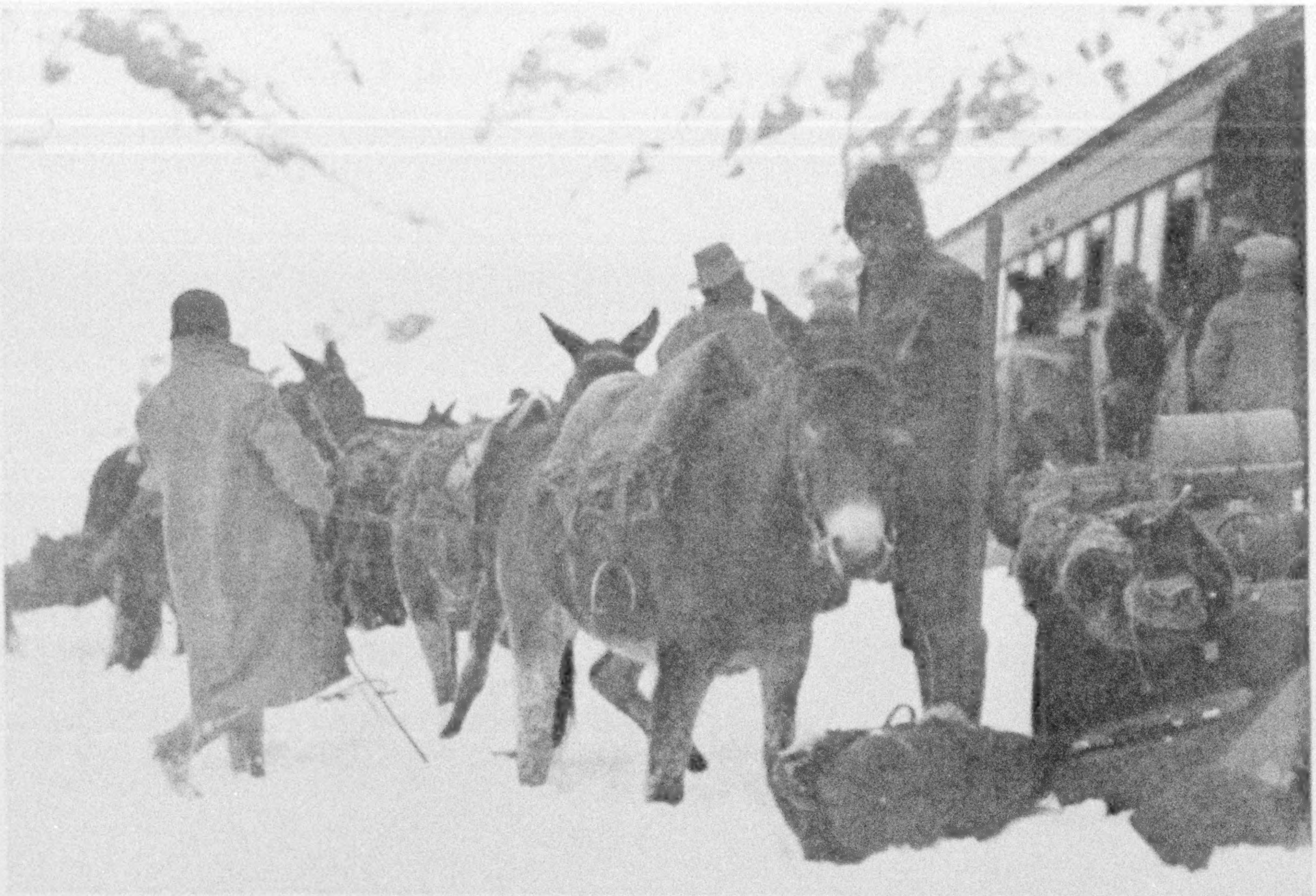


Photograph from Armando Peró

THE CHRIST OF THE ANDES

The old wagon-road over the Andes, in use before the completion of the Transandine Railway, is through the pass of Uspallata, more than 12,000 feet above the sea. Here stands the statue of the Christ of the Andes, cast from the bronze cannon of the two sister republics of the far south, to keep peace for all time. The inscription under the statue reads: "Sooner shall these mountains crumble into dust than the people of Argentina and Chile break the peace which they have sworn to maintain at the feet of Christ the Redeemer."

The conception of this monument came from the hearts of two Argentinos, Señora Angela de Costa and Bishop Benavente. As President of the Christian Mothers' Association, Señora de Costa undertook to raise the funds for the erection of the statue.



Photograph by Harriet Chalmers Adams

THE START ACROSS THE ANDES IN WINTER SNOWS

The author's party leaving the train at the Chilean station of Juncal for the start on mule-back over the Andes, at a time when the line was blocked by avalanches. The unbeaten trail, over slippery ledges and through deep snowdrifts, brought the travelers through the two-mile tunnel in the heart of the Andes into Argentina. There was then a second day's ride over icy wastes to the Argentine railhead where train traffic could be resumed.

The metropolis of Magallanes has taken on a pleasing, prosperous air.

This has long been an important fur market. Guanaco skins, pampa fox, cordillera wolf, white hare from the ice-fields, and muskrat are on sale. Belgian hares, introduced in recent years, have become such a pest that the government has placed a bounty on their heads.

In the old days seals, sea-lions, and otters were unmercifully hunted, the seal rookeries to the south eventually being destroyed. The seals used to devour the crabs which, with other shell-fish, swarm Fuegian beaches.

The most characteristic animal of the region, the guanaco, is now freed from the fear of the Indian-with-his-arrow, the enemy he has survived; but there is still the sheep ranger's shotgun. It is a pity that this animal has not been domesticated as was its cousin, the llama. Herds of several hundreds of these graceful, ruddy, dappled creatures may still be seen occasionally in the interior of Tierra del Fuego. Wild cattle, descended from those introduced by early settlers, are found in the mountains.

In the eighties there was a rush of miners to this part of the world. The prospector bought a boat instead of a burro and headed into the labyrinth of canals south of the Strait. Gold was to be found in the black beach sands beneath the frowning precipices and in the river beds. The gold fever now has passed, but dredges are still at work. Some of the disappointed miners took to sheep-farming.

One of the largest sheep-farming companies in the world is located in Punta Arenas, its dividends in the last four years amounting to $14,000,000. There are five canning and freezing plants in this territory.

Most of the Chilean sheep-ranges are on the Island of Tierra del Fuego, where the cold climate makes for firm flesh and thick fleece. Were we to marshal the Chilean sheep in one straight line, it would just about stretch from New York to San Francisco.

Besides its sheep-farms and placer mines, Chilean Fuego has its coal deposits, of a rather poor quality, and an abundance of peat which can be used for fuel. Its lakes are all salty, some so rich in pure salt that the deposit is taken out by the spadeful and shipped to Punta Arenas for table use. When these islands, the tops of a submerged mountain range, rose from the sea the salt water remaining in the hollows formed lakes.

The wind here reaches a terrible velocity, being at its worst in the spring (our autumn).

Fuego is approximately 1,000 miles farther south than Cape Town, in Africa.

The forest is rich in conifers and beeches—a dark, gloomy, dripping forest, on the whole, yet the haunt of innumerable beautiful birds. I cannot here name them all. The albatross, penguin, pelican, cormorant, and their like seem at home here; but I had not expected to find a woodpecker (*Ipocrantor magellanicus*) and a thrush (*Turdus magellanicus*) peculiar to this region, or one of the parrot family so far south.

Great flocks of gorgeous flamingoes arrive from the north, followed by their inseparable companions, the white, black-throated swans. When startled, the flamingoes whirl aloft in a scarlet chain, forming a perfect triangle in the azure sky, and the devoted swans follow. An occasional sight is that of a number of tall wading birds, their legs imprisoned by the freezing of a lake, released only with the midday thaw.

A BLOODY PAGE IN CHILE'S HISTORY

In 1904 we still were able to find some of the original Fuegians. The Alacalufs, canoe Indians, used to inhabit the western reaches of the Strait; the Yaghans lived nearer Cape Horn. The Onas were to me the most interesting of the three groups. During the last years of the nineteenth century and the first fifteen years of this century these Fuegians steadily decreased and are now practically exterminated. It is a bloody page in Chile's history.

I am glad that I went there in time to see a little of the Onas, hunters and fishermen of no mean ability, with round, smiling, Mongoloid faces, elaborately painted, their hair bobbed. They wore fur caps and guanaco-skin garments, fur side in.

Poor souls! They got as far south as the continent permitted, but even then the white man crowded them off!

Cape Horn, on Horn Island, is Chilean, the tip end of South America. The cape, rising about 1,400 feet above the sea, withstands the pounding of the tempestuous surf. Only about one-third of the days of the year here are free from rain or clouds. Few voyagers see the cape, since ships steer a course well off shore. In southern Tierra del Fuego, mighty glaciers, reaching the sea, slowly break off and form icebergs which float toward Antarctic waters. It is, in truth, the dropping-off place of the Andes.

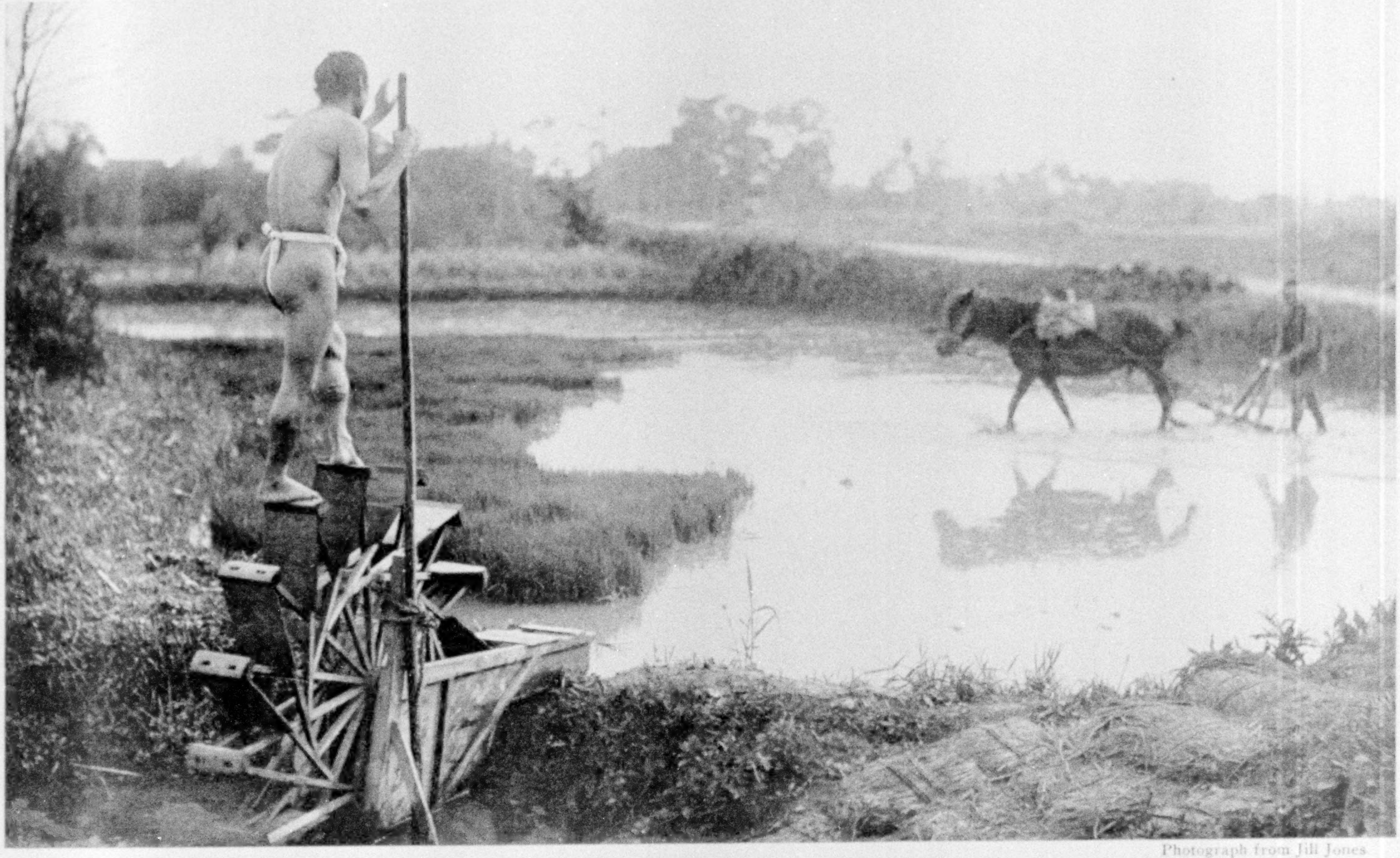
CROSSING THE ANDES IN WINTER

We have made three visits to southern Chile. On the last journey, instead of sailing around into the Atlantic, we returned to Valparaiso and crossed the Andes via the Transandine Railroad to Argentina. It was not, however, an uneventful journey in a Pullman coach, in the season when this trip of 888 miles can be made, very comfortably, in 48 hours.

Winter had set in. Avalanches in the mountains had blocked the road. After many fruitless trips to Los Andes, at the foot of the Cordillera, we at last joined a party of restless pilgrims determined to cross the Andes that very month aboard a valiant mule. We lived to tell the tale.

Two long days there were of it between the rail heads on either side of the mountains; two days of scaling icy ledges, plunging through snowdrifts. Our trail lay, not over the old summer wagon-road, past the Christ of the Andes, in the Pass of Uspallata, but through the two-mile railroad tunnel, 10,000 feet above the sea, which connects the sister republics.

Chile we left with its snowfields glistening in the sunlight; Argentina we entered in a wild snowstorm. That long, silent ride through a damp, inky, inner world left a deep impression, a feeling of awe of those stupendous heights, those mighty mountains we had followed throughout the length of Chile.



Photograph from Jill Jones

A JAPANESE FARMER PUMPING WATER INTO HIS PADDY-FIELD

This golden-skinned, full-chested, and strong-backed son of the soil turns water into his fields by stepping from tread to tread of this small paddle-wheel. Note the primitive plow used by the man in the background.

SOME ASPECTS OF RURAL JAPAN

By Walter Weston

Author of "The Geography of Japan," in the National Geographic Magazine

OF ALL the poetic titles applied by the Japanese in olden times to their land, perhaps the most ancient was that of Toyo-ashiwara-mizuho-no-kuni, "The fertile, reed-clad country, rich in grain." In this we have the intimation that from the earliest ages of the national existence agriculture has been the occupation of the majority of the people and their most fruitful source of livelihood.

The sudden emergence of modern Japan from the hermit-like seclusion of former days into the rush of busy intercourse and competition with the Western world has tended to blind the eyes of many observers to that which really forms the basis of its national prosperity.

It is only in rural Japan that we gain an insight into the most characteristic features of the life of the people. The real strength of national organization and the most attractive aspects of the national character cannot be fully appreciated until one passes from the crowded cities and westernized beaten tracks to the fields and farms of one of the most intelligent and friendly peasantries in the world.

In spite of the rapid strides made in the manufacturing and mining industries in recent years, agriculture still constitutes the chief source of the wealth and power of the Japanese people.

The rural population number sixty per cent of the whole, and it is they who supply the empire with most of its food and with the greater part of its raw materials for manufactures.

PRACTICALLY NO MACHINERY USED IN JAPANESE FARMING

There are few large landed proprietors, and a feature of agriculture is the tillage of small holdings. This is carried on by the whole of the farmer's household. The land does really belong to him, for the popular idea that both the peasantry and their fields are property of the Emperor is a mere legal fiction, and it is no wonder, therefore, that the man "on the land" works as few peasants in the world have ever been known to work.

Only about twelve per cent of the whole area of Japan is cultivable, and even this is not naturally very fertile. It is only made to yield its utmost by the most minute and careful system of subsoil working, manuring, terracing, and irrigation, and these are carried on with a thoroughness that almost suggests gardening rather than farming.

There is practically no machinery employed and nearly all the work is done by hand, hoe and spade, helped out at times by the ox or the horse. It is in the task of their subjugation of the land to the service of man that the best characteristics of the Japanese people have been developed—their boundless patience and perseverance, their intelligence, ingenuity, and self-control, their tough constitutions and temperate habits.

PEASANTS MAKE EXCEPTIONAL SOLDIERS

Some of the finest fighting men in the army are drawn from the peasant classes—hardy, stolid, and entirely unafflicted with nerves. Most of them come from the hill country, and their surroundings have left their impress on their character and habits.

It was remarked by British officers during the Russo-Japanese War that, in districts where long marches had to be made over routes chiefly leading along goat-tracks or across pathless gullies and crags, each man having to find his own way and to meet his company again on the other side, it was the native mountaineering habitudes of the lower ranks that led them to take the best possible line of country.

In mountain warfare the hillmen among the Japanese infantry displayed—as compared with other infantry—some of the attributes and mobility of cavalry. Moreover, there is something in the open and communistic character of the daily life of the country people (for to them privacy is an unknown condition) that renders

Photograph from Publishers' Photo Service

THE TEA-PICKERS OF JAPAN WEAR LONG SLEEVELETS OR GLOVES TO KEEP THEIR HANDS AND ARMS FROM BEING SCRATCHED

them natural and considerate and promotes a resourcefulness and readiness to help each other that must be experienced to be understood.

It is among such as these that one finds human nature most unsophisticated and unspoilt, nor has all that is artificial and materialistic in our vaunted twentieth-century civilization yet laid a paralyzing hand upon that inborn simplicity and courteous bearing which in days gone by did so much to justify the title by which the Japanese delighted that their land should be known—*Kunshi no Koku*—"The Country of Gentlemen."

One of the most striking features of the countryside, to one who wanders out from the crowded life of the great towns, is the extraordinary and minute care with which the hills, rising abruptly, as most of them do, from the alluvial plains and the seashore, are terraced from base to summit, wherever a single ear of rice or corn can be made to grow, the resultant landscape resembling nothing so much as a gigantic chessboard decked in yellows, gold, and greens of every shade.

What makes these agricultural achievements the more astonishing is the fact that they are attained with the most primitive of instruments, for the peasantry are the most conservative class in the nation. The whole of their agricultural system was borrowed from China nearly two

Photograph from E. Gertrude Beasley

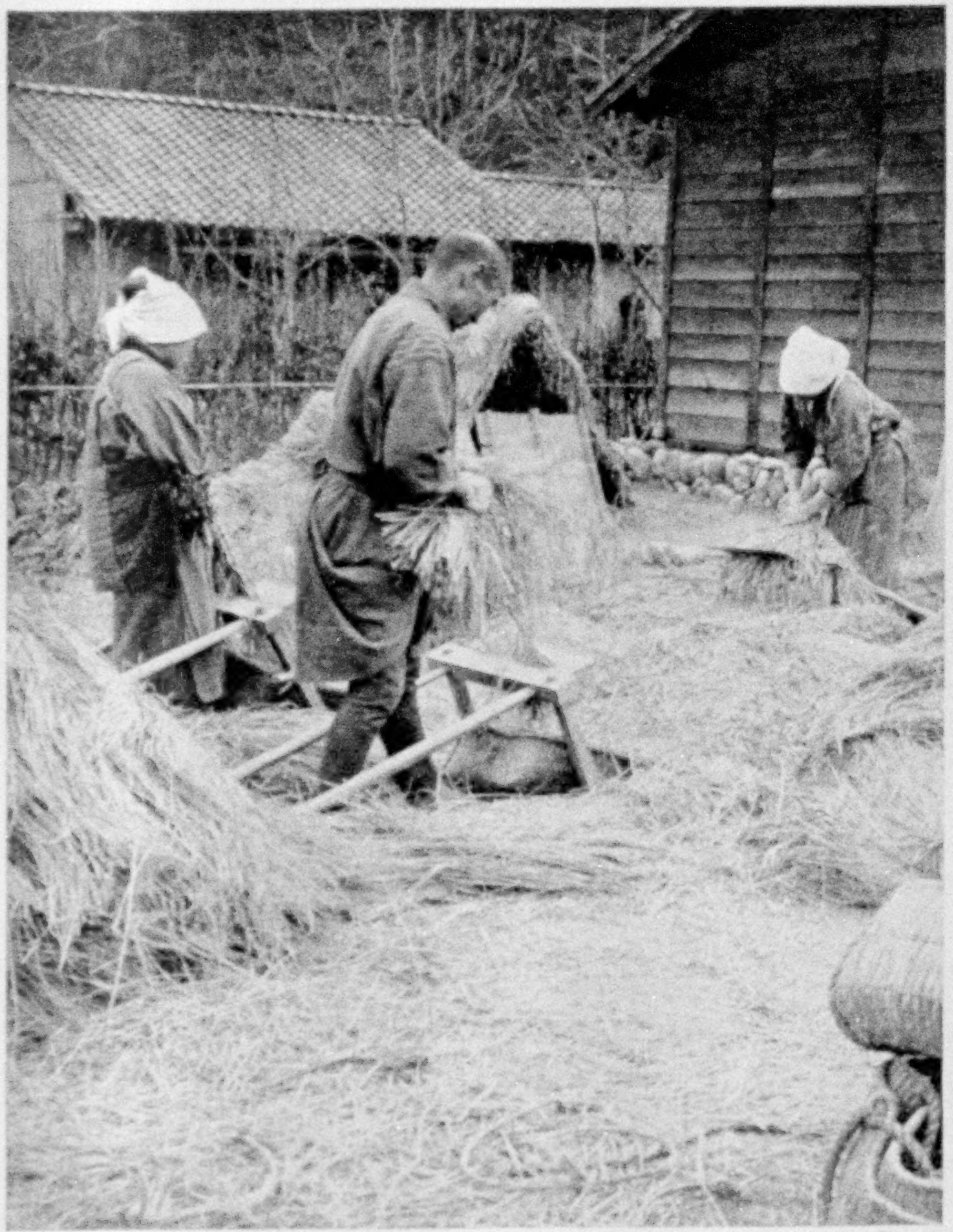
GATHERING LEAVES FOR FUEL SEEMS TO BE A CONGENIAL OCCUPATION IN JAPAN

thousand years ago and has known practically no change. The plow they use is that of the Egyptians of the days of Pharaohs, and spade, hoe, sickle, harrow, and flail differ but little from those of their instructors. The wagon and the wheelbarrow are almost unknown.

Of all the ancient and popular festivals of Japan, those that are celebrated with the greatest zest and enjoyment invariably belong to the life of the countryside and form a standing witness to the primeval and paramount significance of agriculture to the entire nation. The so-called "national ones," dealing with alleged historical events, are of official origin and nearly all quite modern. Their observance is chiefly confined to the large towns and exercises comparatively slight influence on the popular sentiment or imagination. To the outer world, these are sufficiently unfamiliar and significant to deserve record by way of illustration.

THE FESTIVAL OF THE FOX GODDESS

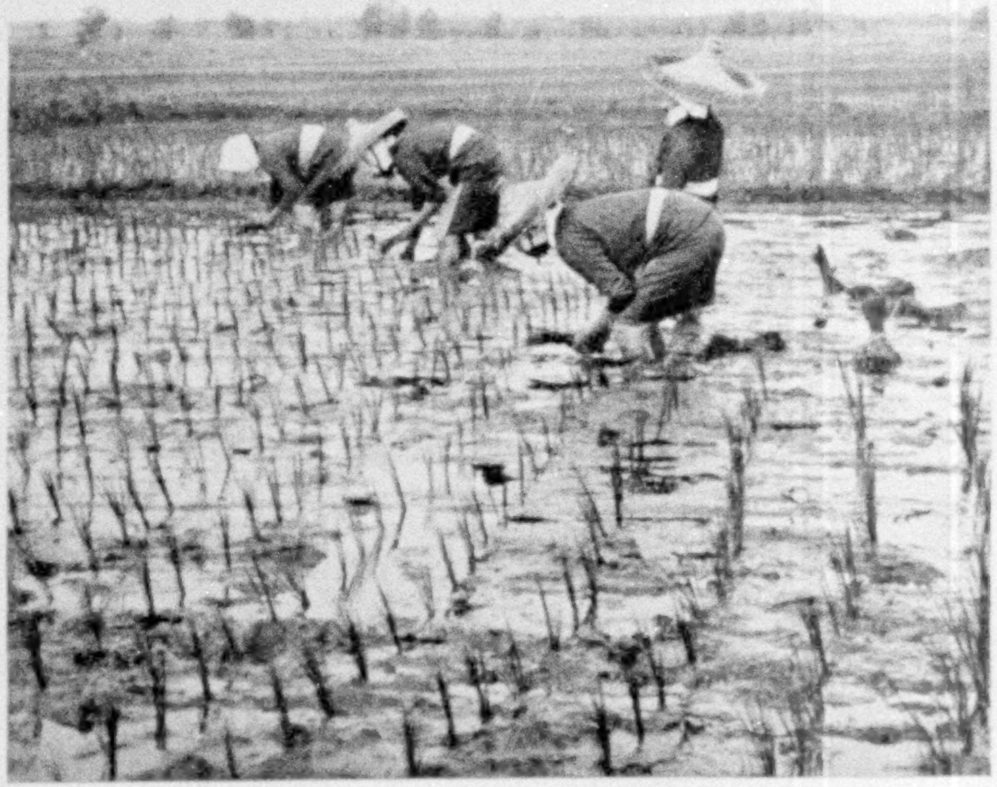
One of the earliest in the year is that of Inari-Sama, the Goddess of Food, at whose gaily decorated shrine services of intercession are held on the first day of the second month (old style)—*i. e.*, March—on behalf of a fruitful rice harvest later in the year. Inari-Sama (about whose sex there is some ambiguity) is sometimes spoken of as the Fox Goddess,



Photographs by T. Enami

THRESHING RICE THROUGH A FRAME SET WITH IRON TEETH

The Japanese farmer accomplishes the most astonishing amount of work with implements like those the Egyptians and early Chinese used thousands of years ago. From the latter Japan borrowed her whole agricultural system.



UP TO THEIR KNEES IN WATER TRANSPLANTING RICE SHOOTS

The sunshades worn by the laborers are made by the women and girls from shredded strips of that "lady of grasses," the bamboo. They are not woven on frames, but get their shape from the manipulation of the materials in the weaving.

XUM

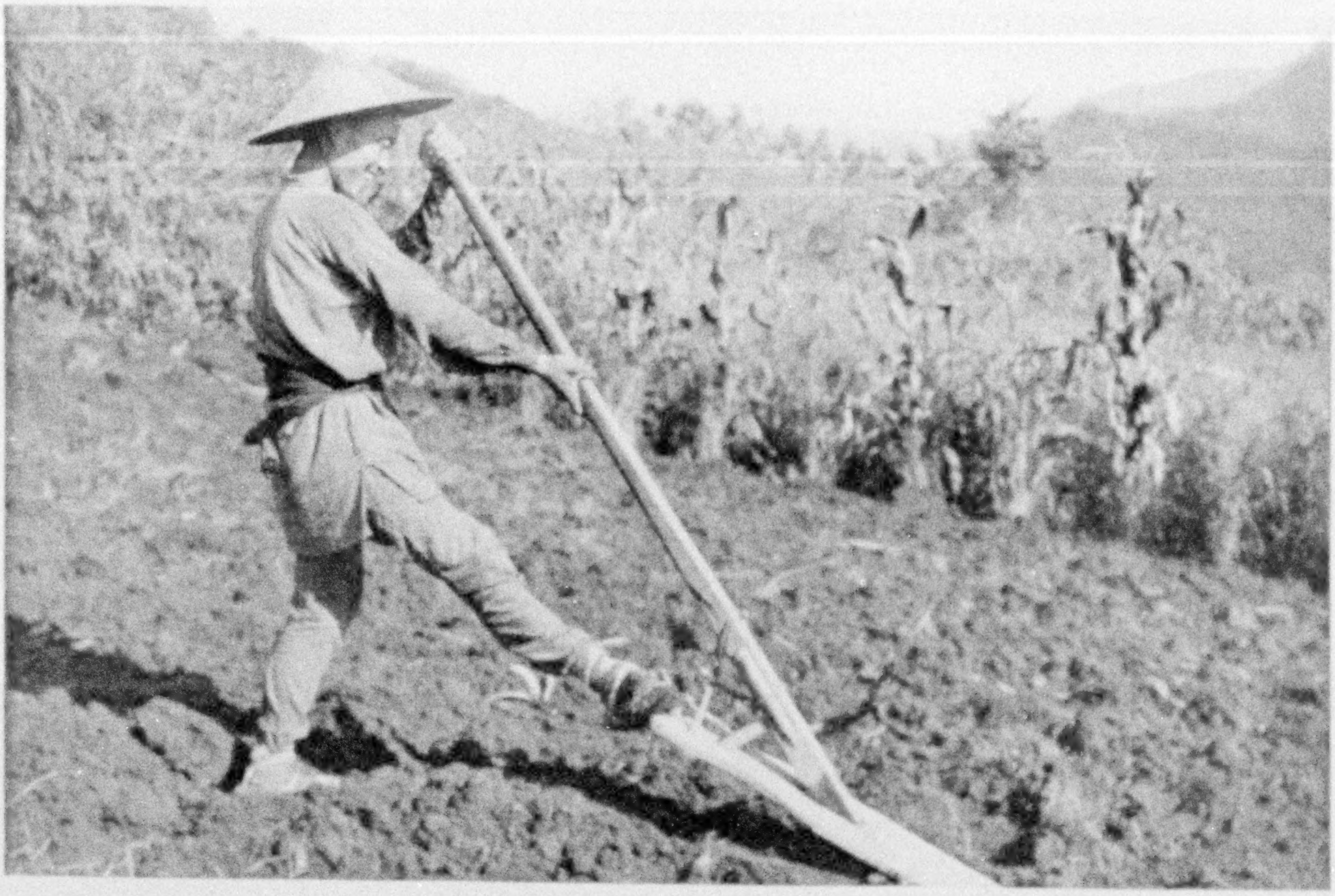
TO KEEP THE HOME FIRES BURNING

Nearly one-half the forest area of Japan belongs to the state and the imperial household. Some coal is mined in the islands, but the chief dependence for fuel is on wood.

Photographs by T. Enami

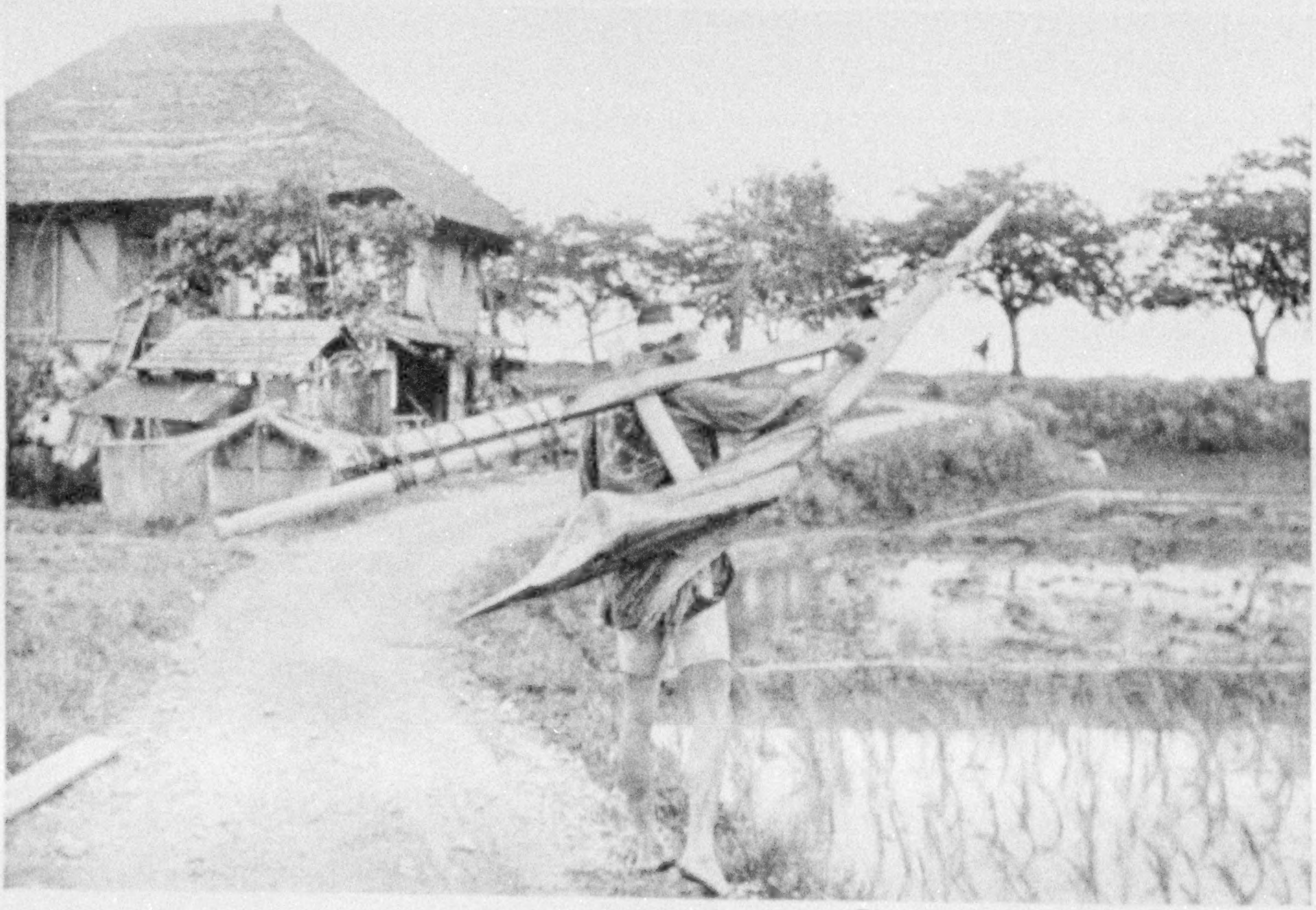
THE MOTHER AND ONE OF THE BABIES GET A STRAW RIDE

The coöperation of the entire family is necessary to make the Japanese farmer's business a success. Here old and young are seen returning home after a day spent in the rice fields.



HAPPY BECAUSE THE NEW CROP WILL SOON BE IN

The Japanese farmer's devices for cultivating the soil are curious in their primitiveness. The picture shows the wooden spade used for turning up the soil. The remainder of the cultivation will probably be done with a heavy single-bladed hoe for digging, a three-prong hoe for breaking the soil, and other queer home-made things, such as sickles and pruning-hooks with straight handles and curved blades set at right angles.



Photographs from E. Gertrude Beasley

"THE PLOWMAN HOMEWARD PLODS HIS WEARY WAY"

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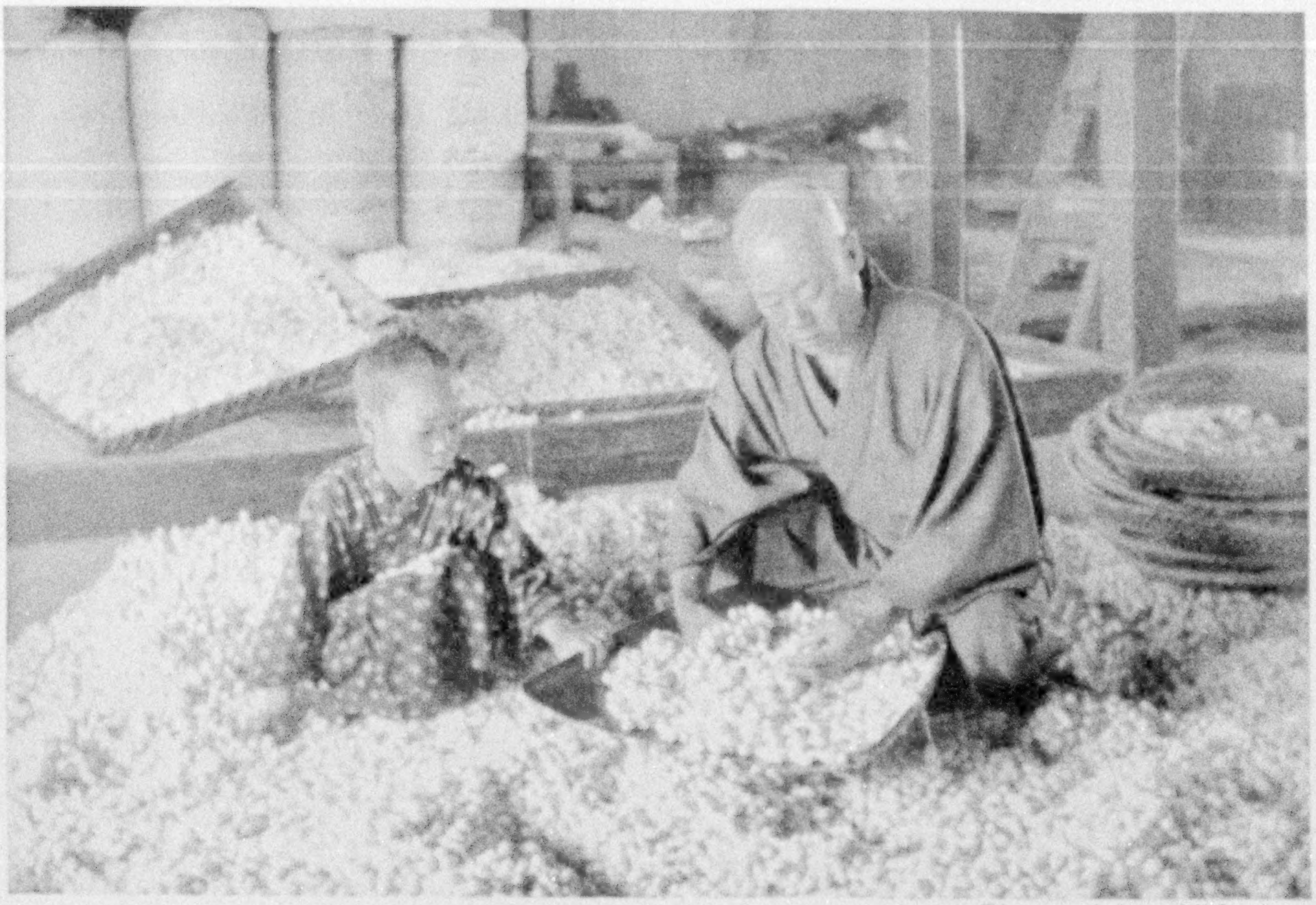

Photograph from Jill Jones

MILADY'S SILK FROCK IN ITS TRULY EMBRYONIC STAGE

"The honorable little gentleman," as the Japanese call the silk-worm, contributes $100,000,000 to the annual income of the Mikado's people. During the period of its intensive cultivation its voracious appetite keeps whole households busy satisfying its mulberry-leaf needs.

and is commonly identified with her servant the fox.

In view of the all-importance of rice to the whole nation, it is natural that this divinity should be held in such honor, not to say dread, and we find that these festal gatherings partake of the nature of a combination of communion, eucharist, and love-feast. Papers stamped with the picture of a fox are pasted on cottage doors as charms of exceptional potency.

This animal is credited with supernatural powers of bewitchment, and the belief in *Kitsune tsuki*—"Fox-possession"—is very real and widespread. It belongs to a class of folk-lore and superstition of which little is known outside their own country, and but half acknowledged by the educated Japanese themselves, though it is of much psychological and scientific interest to the student and the medical man.

HONOR FOR THE POWERFUL RIVER GODDESS

Japan is one of the most richly watered countries in the world, and as nearly every swift-flowing river and impetuous mountain torrent has its own presiding divinity, we are not surprised to find them credited with power to hurt or help the lands through which their waters pass.

In districts liable to damage through inundations, services of intercession are held in the third month, our April, at popular shrines like those of the River Goddess of Kofu, in the broad and fertile plain of Koshu, in central Japan.

The goddess is taken out for an airing in her sacred car and earnest supplications are addressed to her for the protection of the fields and farms of the peasantry in the coming days when, with the melting of the winter snows and the storms of early summer and autumn, the myriad mountain torrents swell the parent rivers on their resistless course through the cultivated plains to their wide and populated deltas at the sea.

The month of May sees the countryside under its brightest, busiest, and most varied aspects, and in all its activities nearly every one, old or young, has his or her part to play. Barley, wheat, and (especially) millet are ripening and "honorable" tea is now ready to be picked.

The grains enumerated are the real staple food of the rural districts, for though all, who can, live on rice, most of the peasantry, especially in the remoter parts, cannot afford to do so and only indulge in it on high days and holidays or in cases of sickness.

A friend of mine tells me of an old lady whom he heard remark of a sick neighbor in a country hamlet, with a grave shake of the head: "What! do you mean to say that it has come to giving her rice?" In other words, "The poor thing *must* be in a bad way!"

SUPPLICATION IS MADE TO GOD OF HAILSTORMS

The chief festival of this season is that of the God of Hailstorms, and many an anxious farmer in the silk-producing districts in the great inland provinces of Shinano and Kai then visits the ancient village shrine to pray for the preservation of his precious mulberry trees from the dread scourge.

Strangely enough, however, these trees are said to be almost immune from lightning, and there is a popular belief that a man caught in the open in a thunderstorm has only to call out "*kuwabara*"—*i. e.*, "mulberry grove"—in order to surround himself with the prophylactic properties of that valued object and so avert the threatened danger.

The Christian Japanese farmer can read with sympathetic interest the story of the plague of hail in Exodus ix, where we learn that *"the flax and the barley was smitten: for the barley was in the ear and the flax was bolled"* (*i. e.*, in bud).

Nearly every article of food and domestic utility is committed to the care of its own guardian divinity, and a Japanese writer has observed that, if the interests of the peasantry are not protected by unseen powers, it is not for want of earnest supplications addressed to them at all seasons and for every possible boon desired.

Of special significance is the festival of the rice harvest, with its twin observances (like those of the ancient Hebrews) of the offering of the first fruits—in the middle of October—known as *Kannamesai*, with its complement in the *Niinamesai*, on the 23d of November, when the Emperor tastes the new rice that has just been presented at the holiest of all the shrines of Japan—that of the Imperial Ancestors at Ise—at the climax of the ingathering.

The former of these festivals is an essentially popular one, and the best of the precious grain is presented at thousands of village altars throughout the length and breadth of the land.

Close by these, on the stages which are usually found at the side of the most ancient shrines and erected for the purpose, a pantomimic dance, known as *O Kagura*—"The Seat of the Gods"—is then performed to entertain the guardian divinity in grateful acknowledgment of his kindly care, a thought which is further impressed on the children themselves by the closing of the schools, in order to set them free to keep the festival with innocent gaiety.

The arrangements which enable neighboring villages to hold their celebrations on different days, like those in English country parishes at harvest-tide, and so to share their mutual rejoicings, make for a friendly community of interest and neighborly good feeling.

EBISU IS THE DEAF GOD AMONG JAPAN'S EIGHT MILLION DIVINITIES

There is one other festival which is highly popular with the peasantry in late autumn, that of Ebisu, the God of Honest Hard Work, as well as of Wealth. This is kept with twofold energy, partly because all desire to be rich and partly because, on the basis of "sympathetic magic," it is felt that one who controls the gift of prosperity should naturally be courted with every sign of merriment and enjoyment of the good things of life.

At this festival, in the Province of Kii, when the procession bearing the appropriate offerings approaches the shrine the village head-man calls out in a loud voice, "According to our annual custom, let us all laugh"; to which exhortation a hearty response is given.

The reason given for this is that Ebisu alone of all the eight million divinities has not gone to visit the great Shinto shrine in Izumo on the annual holiday

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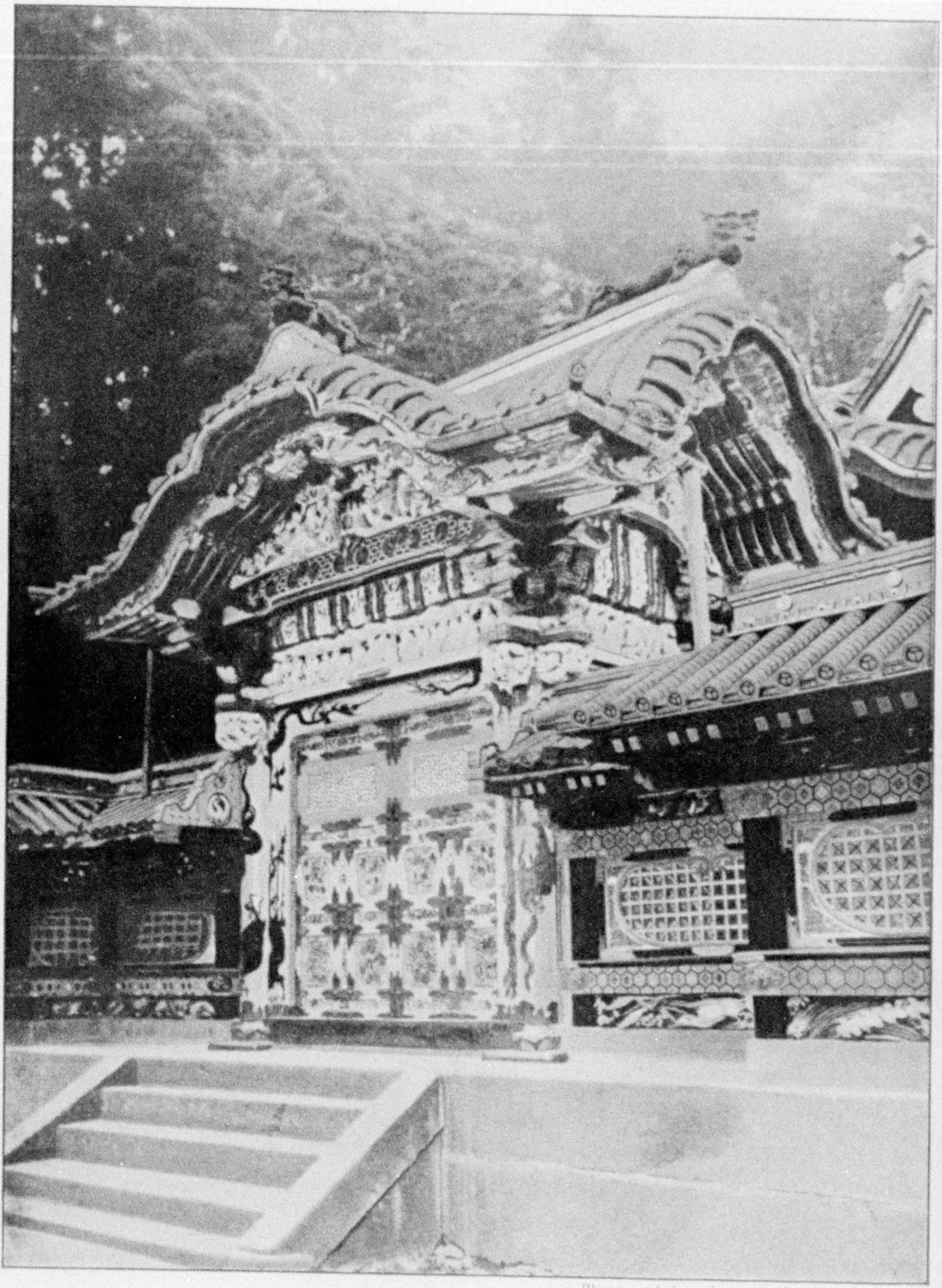

Photograph from Professor David M. Robinson

THE CHINESE GATE LEADING TO THE MAUSOLEUM OF IYEMITSU AT NIKKO

Figures of storks, a white dragon set upon golden waves, and the heads of lions surrounded by arabesques and friezes of chrysanthemums, peonies, pines, bamboos, and birds are among the ornate carvings which distinguish this famous Kara-mon as one of the most beautiful gates in Japan. More than six acres of gold leaf were used in gilding the shrines of the sacred city of Nikko, impressive memorials of the pomp and glory of Japan's Yedo period.

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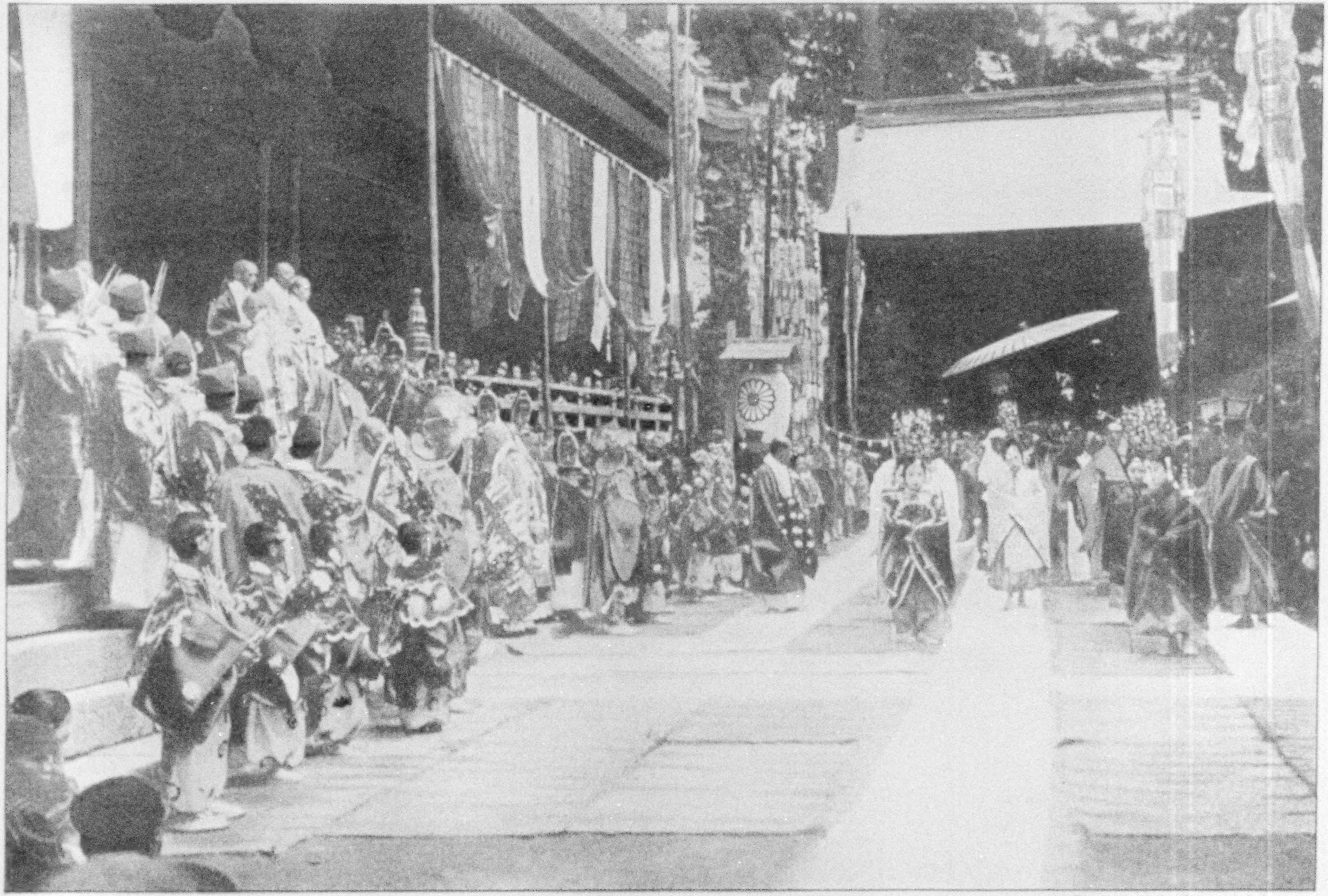
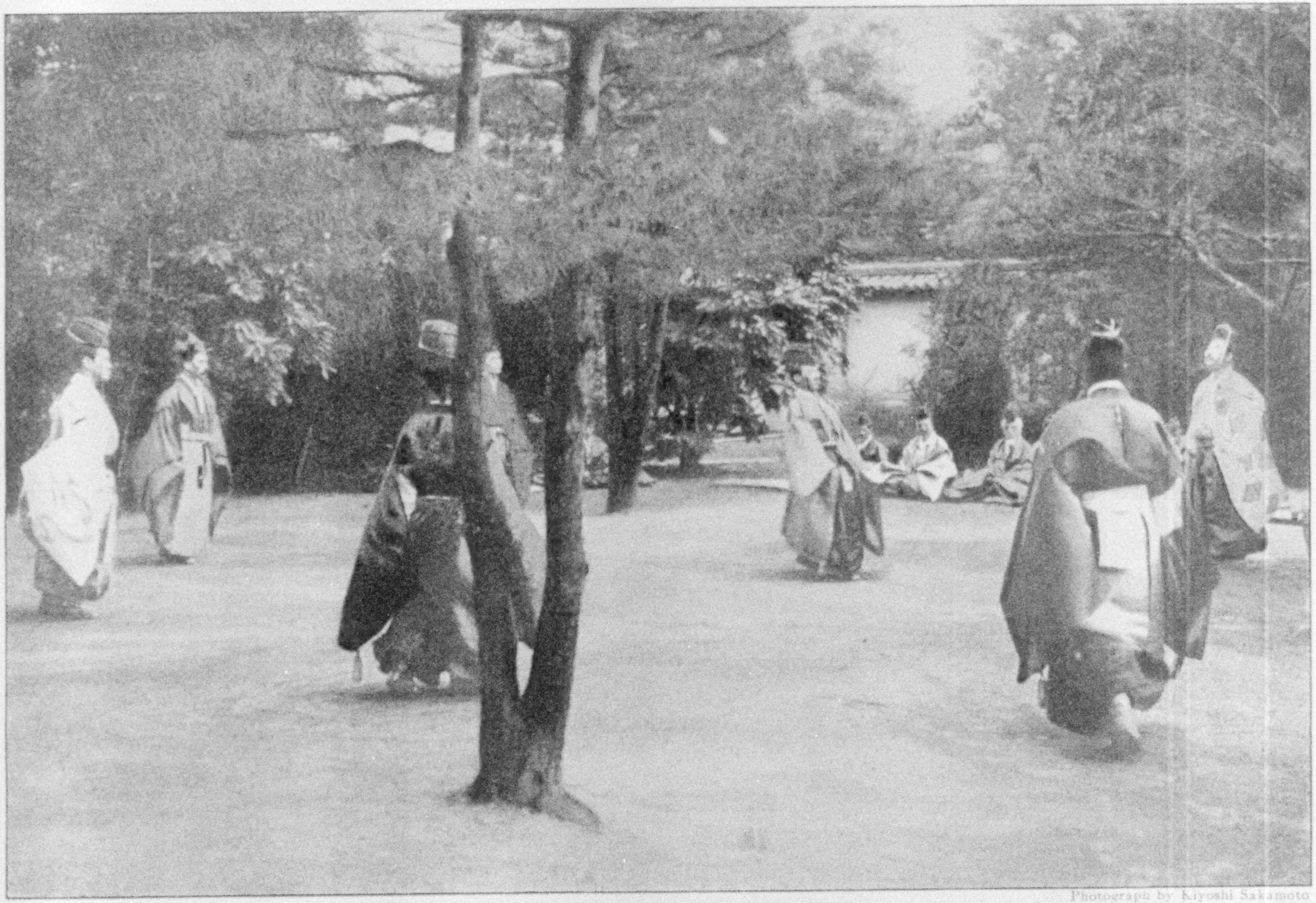


Photograph by Kiyoshi Sakamoto

REGAL POMP AND KALEIDOSCOPIC COLOR MARKED THE GREATEST BUDDHIST MASS EVER HELD IN JAPAN

The renowned Hongwan-ji Temple in Kyoto was the scene of this religious ceremony of indescribable solemnity and beauty when more than one hundred thousand followers of Shinran-Shonin, thirteenth century founder of Shinshu Buddhism, assembled from every corner of the Japanese Empire to participate in a tribute to the memory of the priest whose precepts are followed by more than seven million subjects of the Mikado.



Photograph by Kiyoshi Sakamoto

NOBLES OF KYOTO PLAYING THE ANCIENT JAPANESE BALL-KICKING GAME, SHUKYU

Attired in the colorful costumes of a former day, these titled players are reviving a pastime which was popular in Japan more than a thousand years ago. The ball, resembling a toy balloon, may be descried high in air above the head of the lavender-robed spectator in the background. While it is a football game, it, of course, differs radically from the American sport of the same name.

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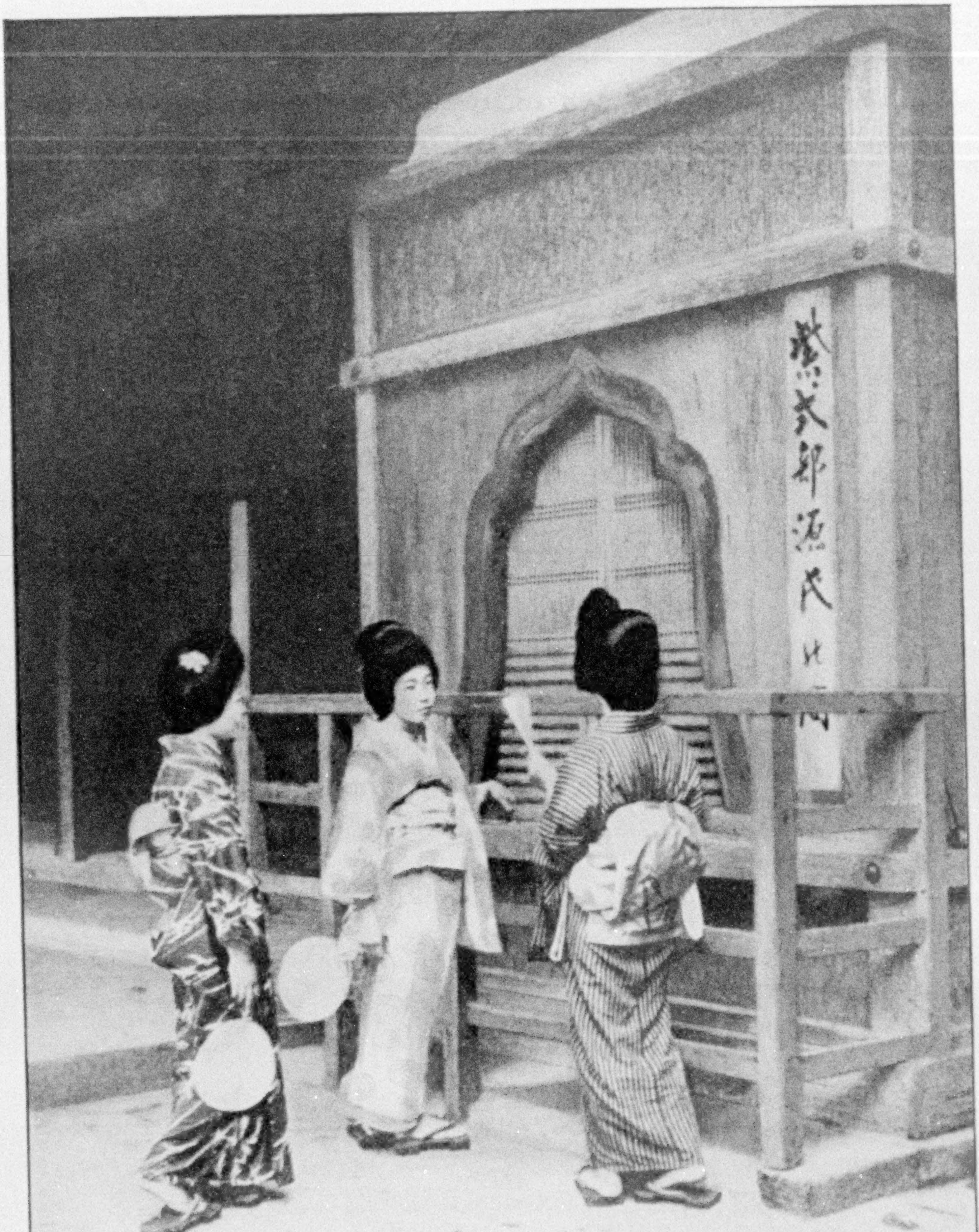

Photograph by Kiyoshi Sakamoto

PAYING HOMAGE TO THE MEMORY OF A GREAT JAPANESE POETESS

These three little maids are in the room of the Ishiyama Temple where the noted woman writer, Murasaki Shikibu, wrote one of her masterpieces, "Genji Monogatari," a classic romance, more than nine hundred years ago. For some reason the fireflies are larger in the vicinity of this temple than in any other region of Japan.

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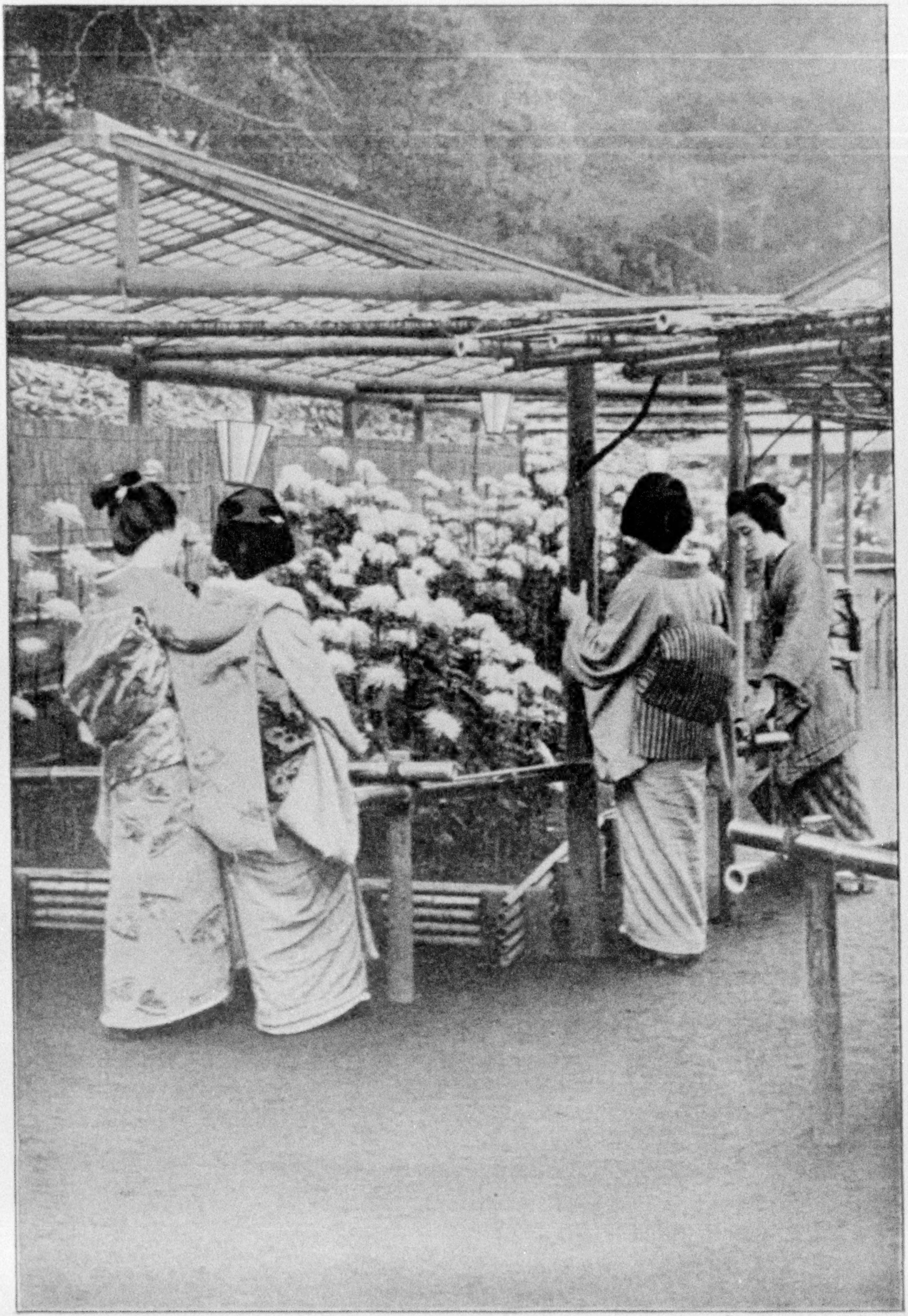
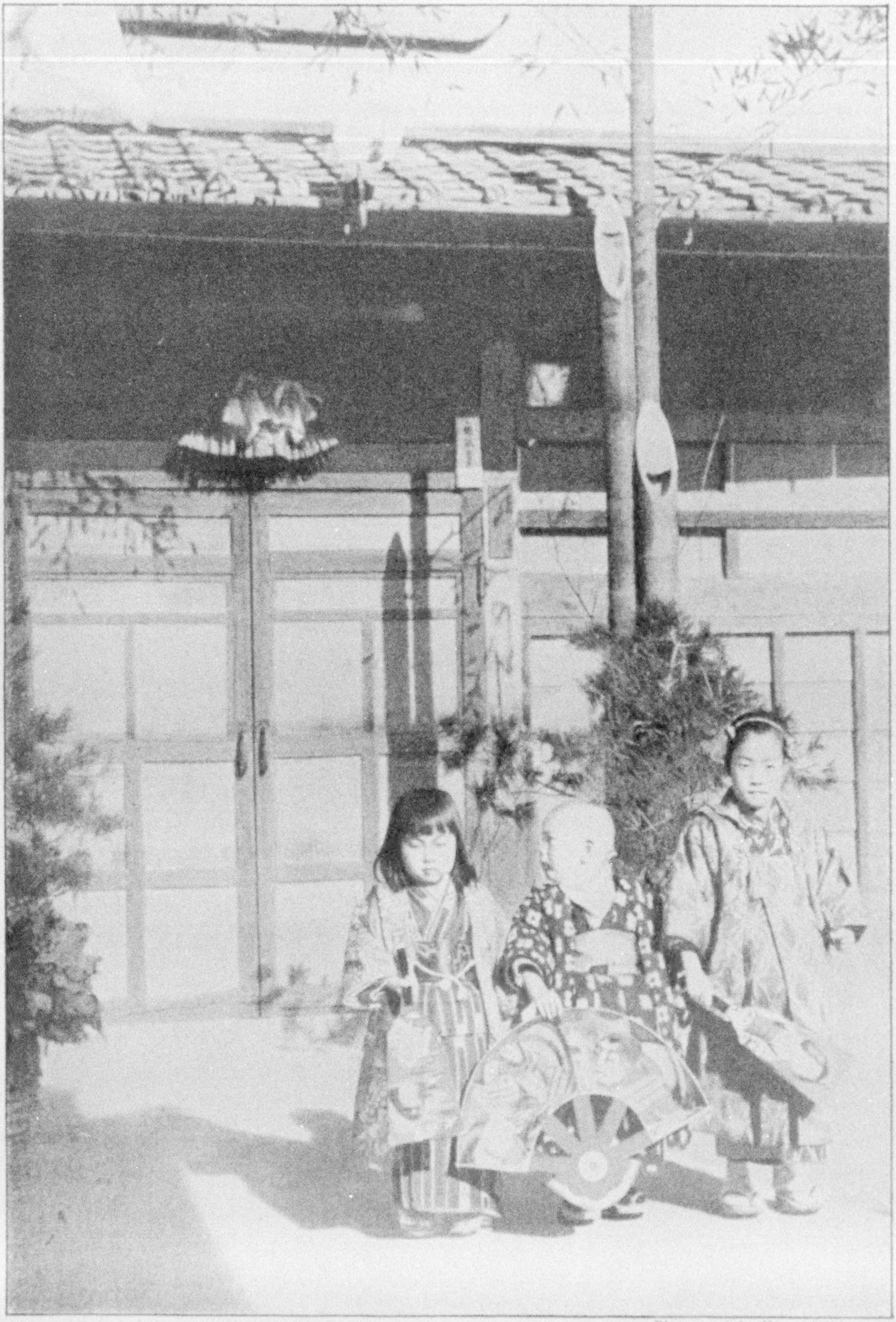


Photograph by T. Enami

FLOWERS OF JAPAN

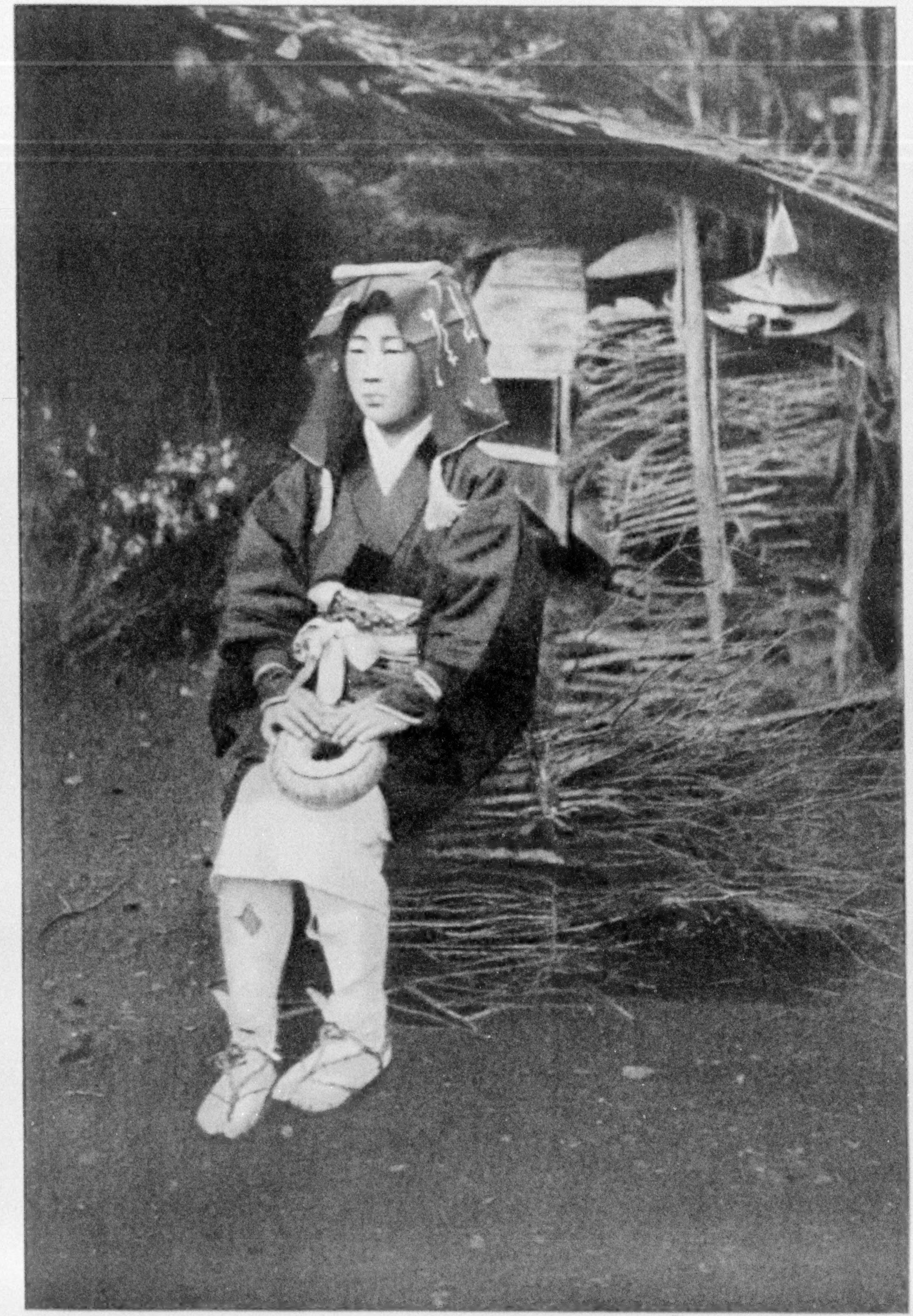
This chrysanthemum garden in Yokohama provides a charming background for the Geisha quartet garbed in their soft-hued, silk kimonas. The "shimada" coiffure is usually a badge of the unmarried woman among the Japanese. While the roof of this greenhouse is of glass, the chrysanthemum fancier frequently uses inexpensive oil-paper to protect his blossoms from the frost.



Photograph by Kiyoshi Sakamoto

YOUNG JAPAN IN NEW YEAR'S REGALIA

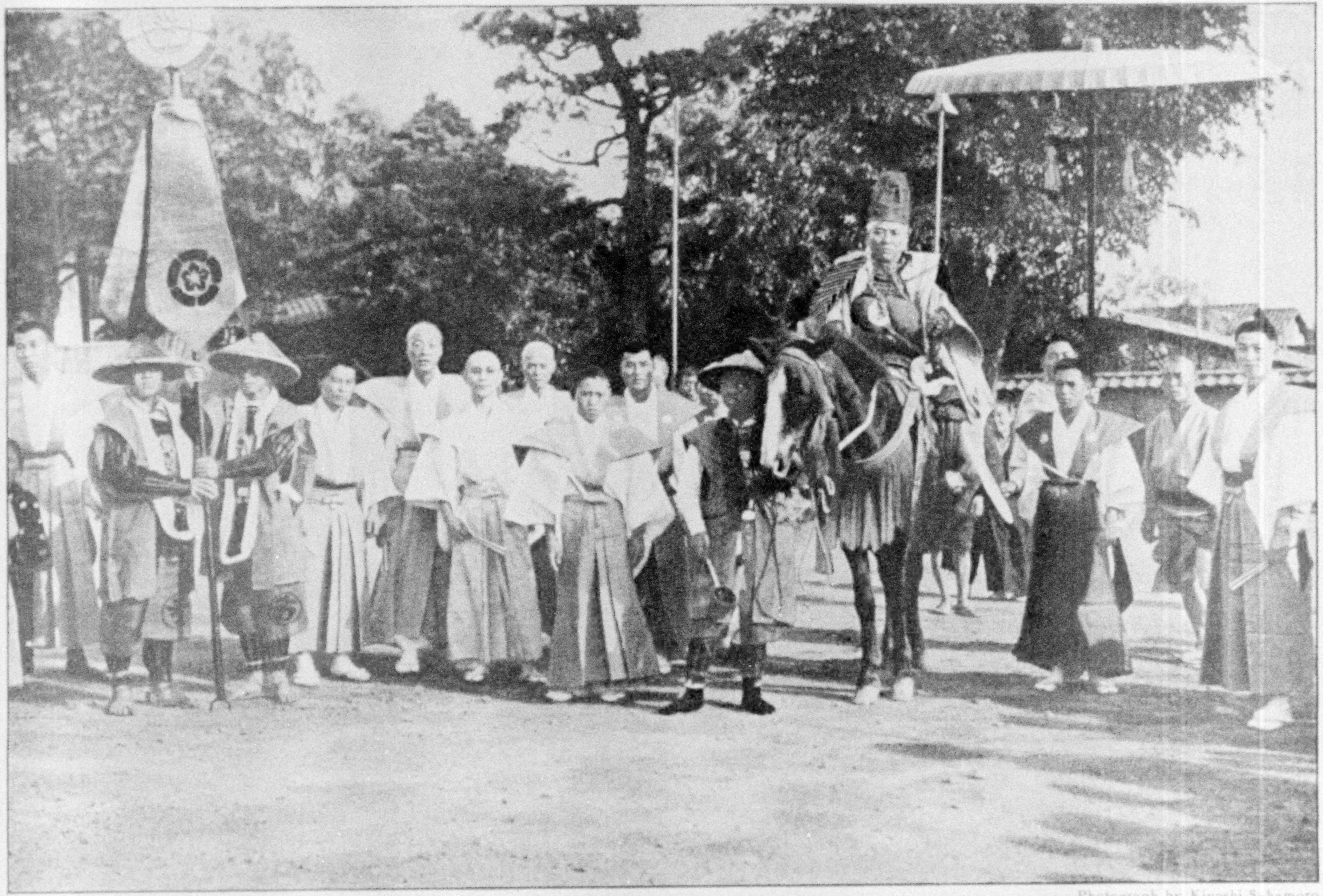
The love of flowers and a highly developed sense for color values, strikingly indicated in this and other illustrations of this color series, are among the generally recognized attributes of the idealistic and artistic sides of Japanese life, which are entirely distinct from, and should not be confused with, the social, economic and political phases of life among the people of the Land of the Rising Sun.



Photograph by Kiyoshi Sakamoto

A FARMER'S DAUGHTER STOPS TO REST WHILE ON HER WAY TO THE CITY MARKET

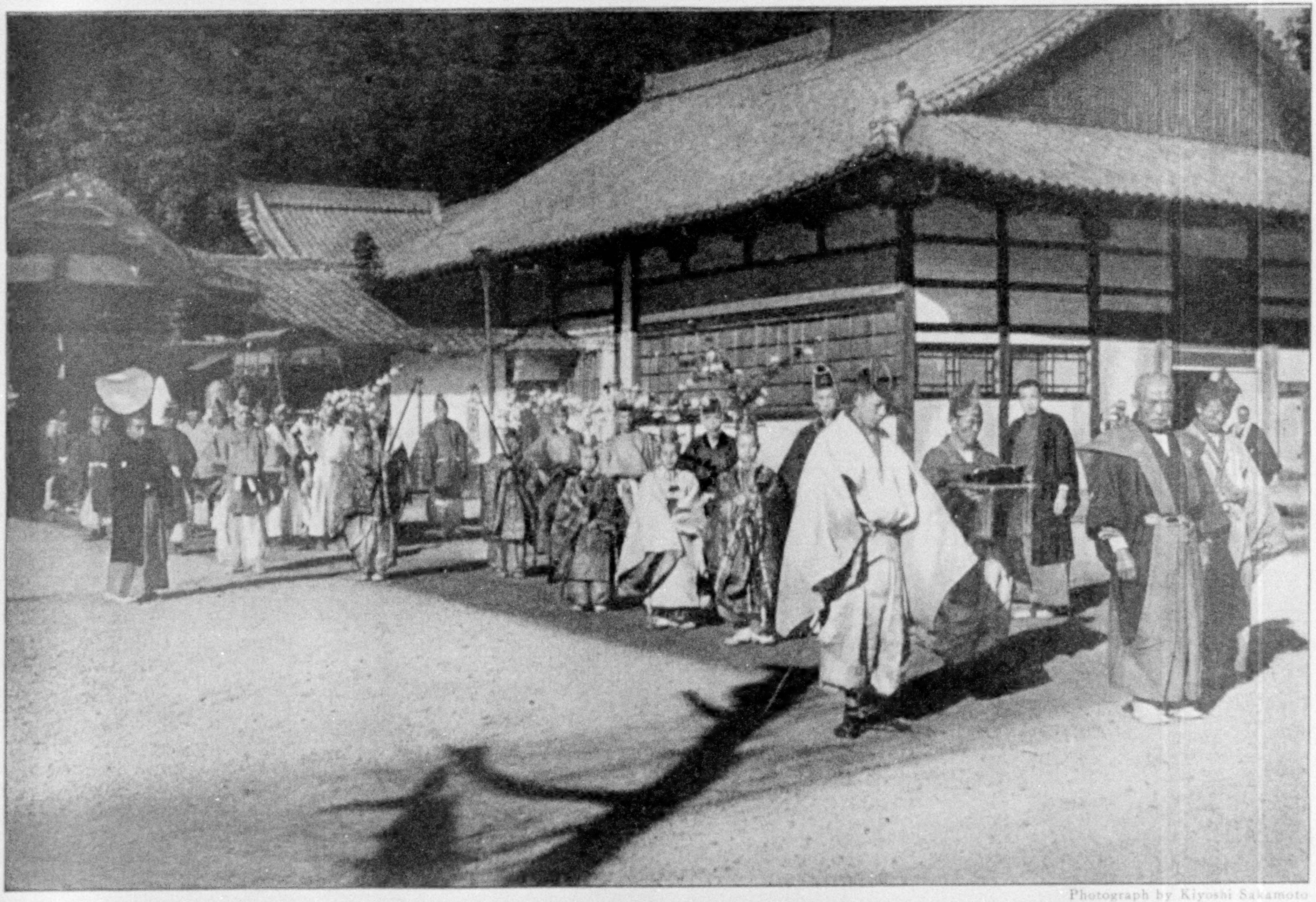
In her hands she holds the doughnut-shaped mat of straw which she uses as a pad when carrying her bundle of fagots on her head. This is not the every-day garb of the farm laborer; she is in her "Sunday best," for her fuel must be peddled from house to house in town.



Photograph by Kiyoshi Sakamoto

THE JAPANESE IN PAGEANTRY DELIGHT TO RECALL THE DAYS OF THE SAMURAI

Every summer a famous festival is held at Kyoto, when magnificent floats and brilliantly costumed groups parade the streets of the former capital of the Empire. The man on horseback sheltered by the ceremonial parasol is wearing the costume of a general. The attendant on his right holds a dipper from which he gives water to the horse from time to time.



Photograph by Kiyoshi Sakamoto

PRIESTS OF THE SHINTO FAITH IN PROCESSION

"The Way of the Gods" is the meaning of Shintoism, a cult of nature-worship and ancestor-worship with the Sun Goddess and Great Ancestress of the Japanese Imperial House, as the chief deity. Women serve as dancers in the Shinto temples.

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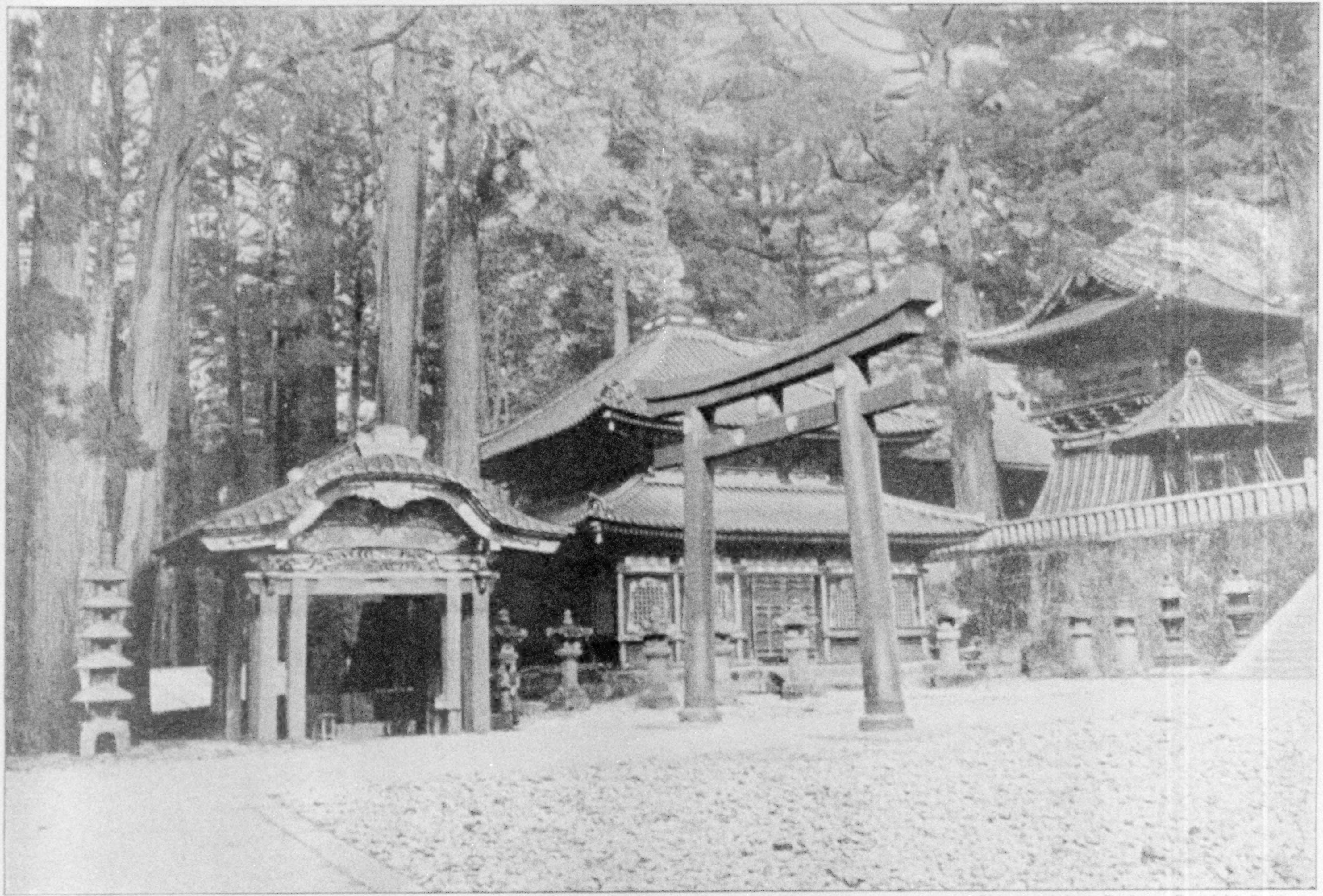
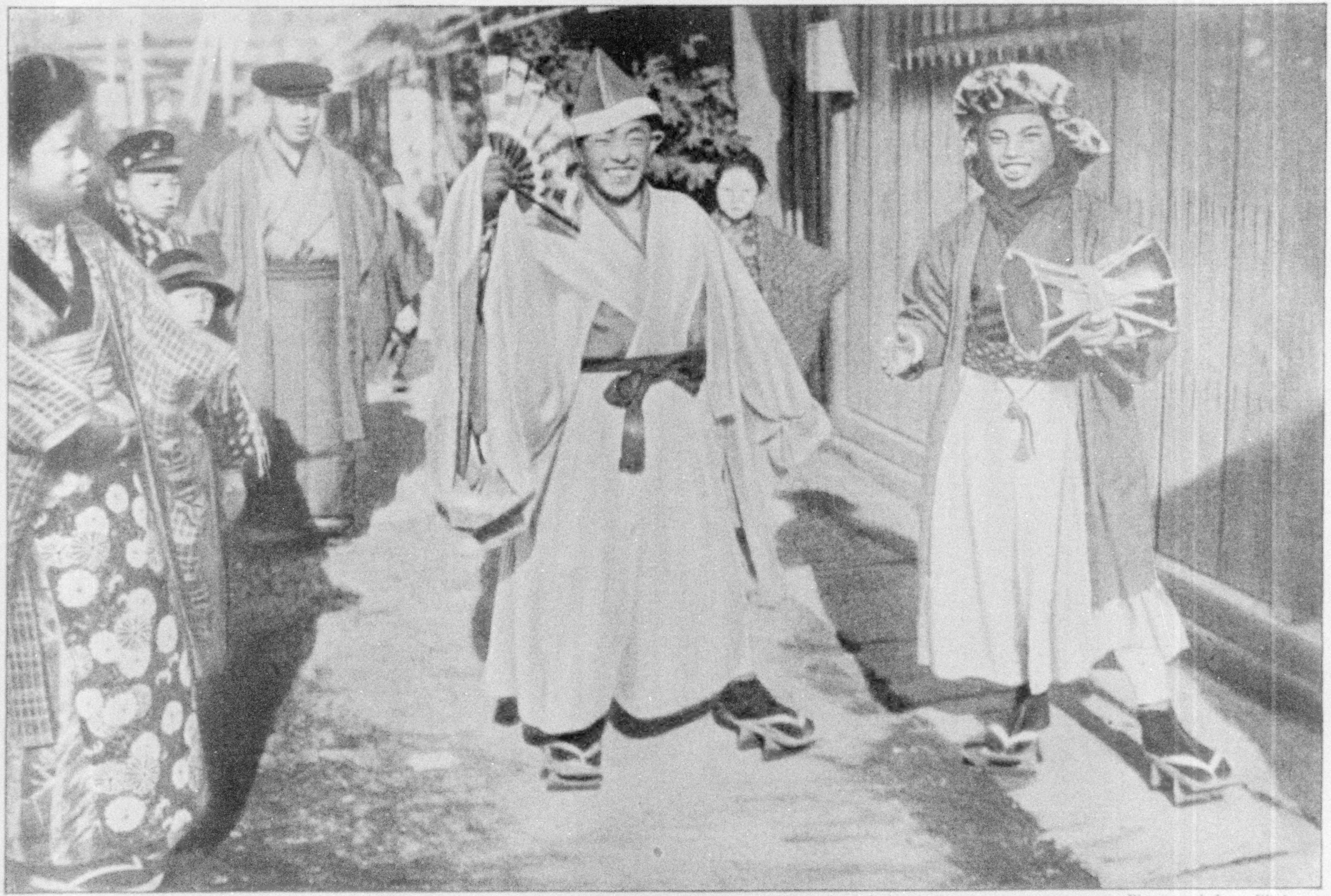


Photograph from Professor David M. Robinson

THE GRAND GATEWAY TO ONE OF THE SHRINES AT NIKKO, BOWERED IN CEDARS

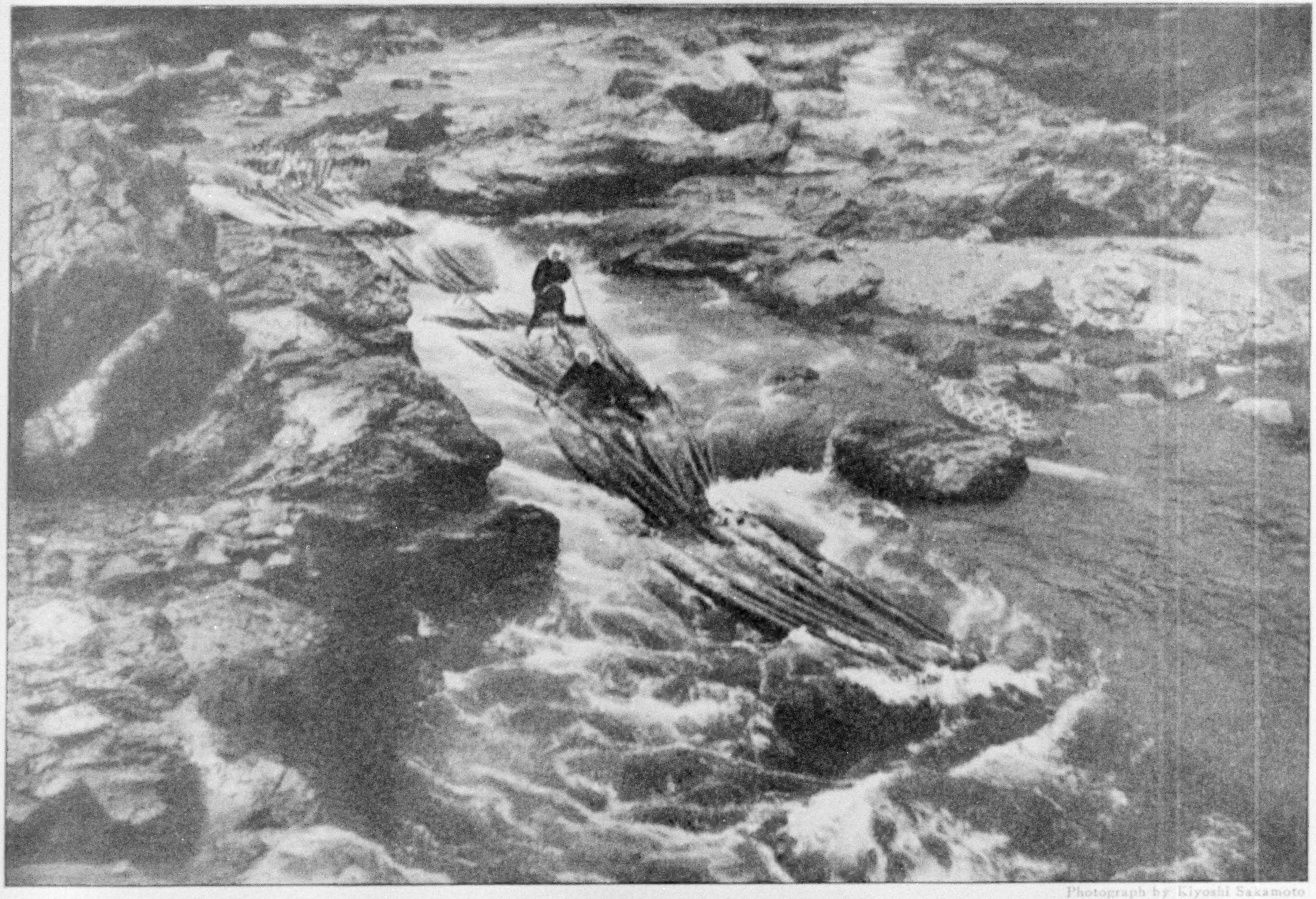
When these shrines were begun three centuries ago, the government ordered the wealthy Daimyos, or provincial chiefs, throughout Japan to make contributions according to their means. One of the chieftains, though he had a retinue of 6,000 Samurai, had neither gold nor silver nor precious stones to give, so he offered as his humble donation thousands of young cedar plants. Today, these centuries-old trees, like the Widow's Mite and the rejected Cornerstone of Biblical history, are among the most priceless possessions of the shrines.



Photograph from Jill Jones

JAPAN HAS ITS STROLLING MINSTRELS IN THE HAPPY MONTH OF JANUARY

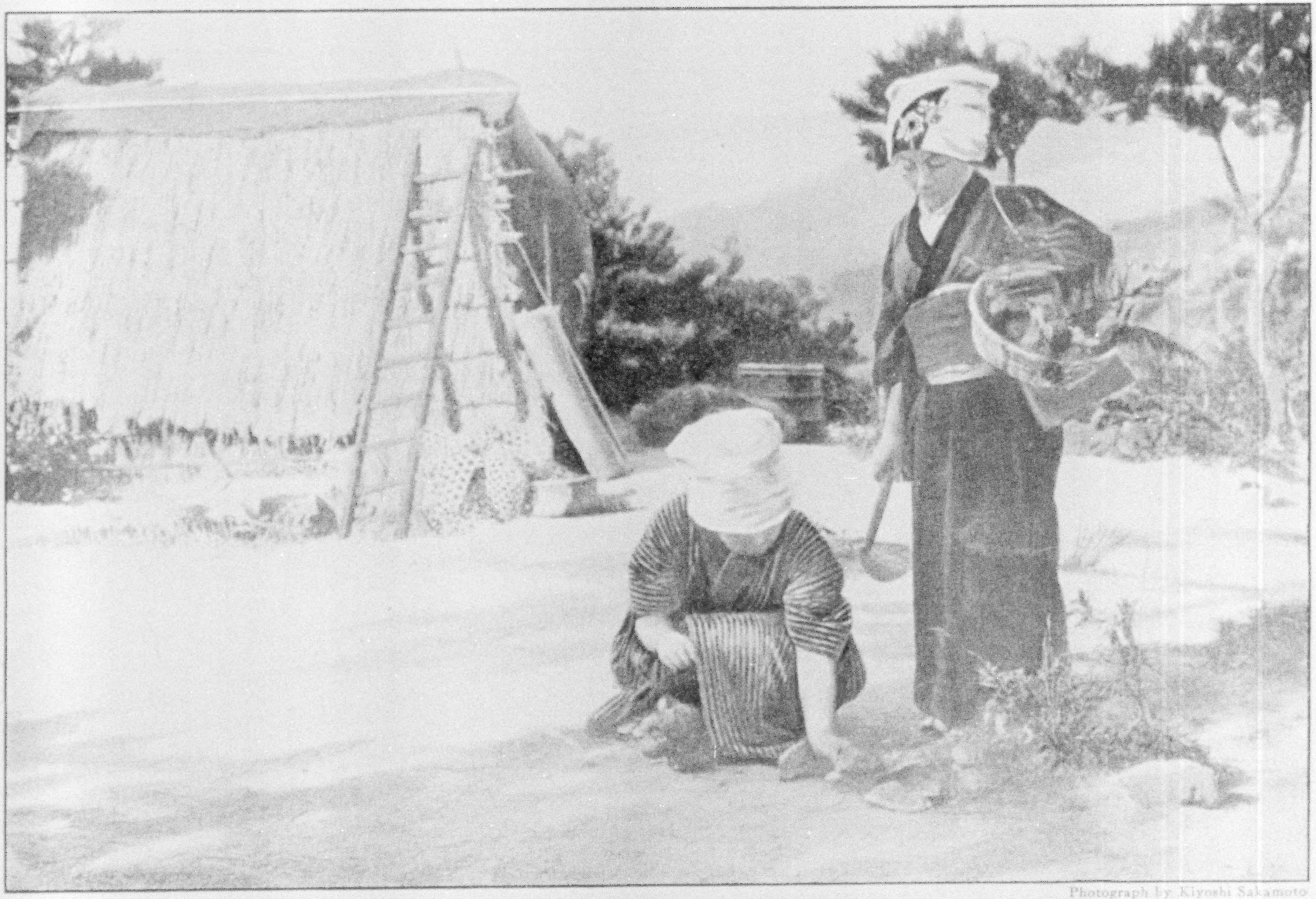
As an incentive to gaiety during the festive New Year season, street entertainers are a picturesque feature of city life. The youth with the fan is a singer who is accompanied by the boy to the right, who beats the drum shaped like an hour-glass. The peasants of Holland wear sabots; those of Japan, the geta. Every man, woman and child tries to smile and be happy on New Year's Day, for as one begins the year so he shall end it, according to the universal belief of this people.



Photograph by Kiyoshi Sakamoto

RAFTSMEN RUNNING THE RAPIDS OF THE HOZU RIVER

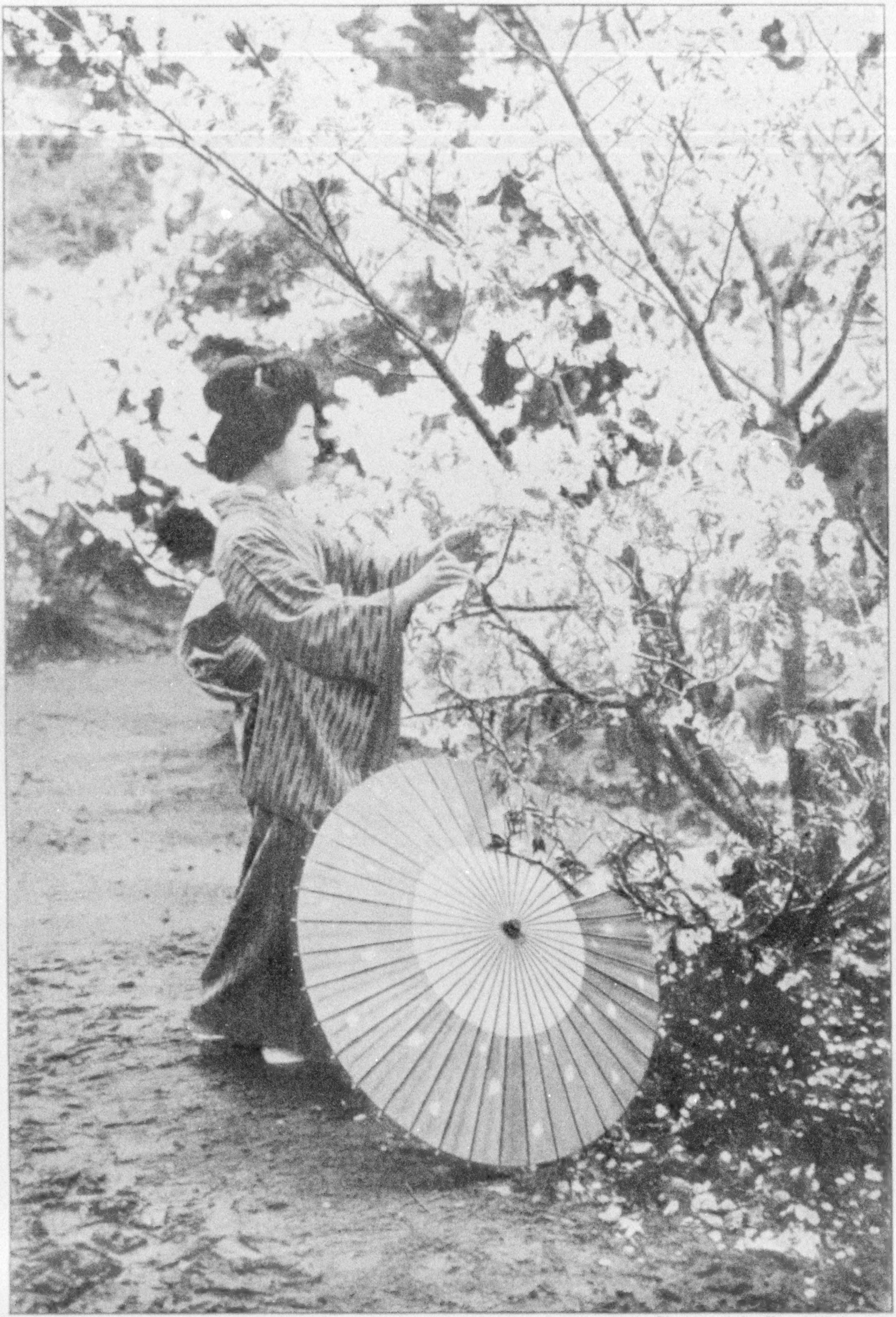
Thousands of tourists have shot through this cascade near Kyoto and have been thrilled by the daring and skill of the four men who pilot the flat-bottomed craft used by passengers, but far more exciting is a trip through the turbulent waters aboard an unwieldy raft. The yellow object in the water to the right is a Japanese jetty made of bamboo and filled with rocks.



Photograph by Kiyoshi Sakamoto

GATHERING MATSUDAKE MUSHROOMS AMONG THE HILLS NEAR KYOTO

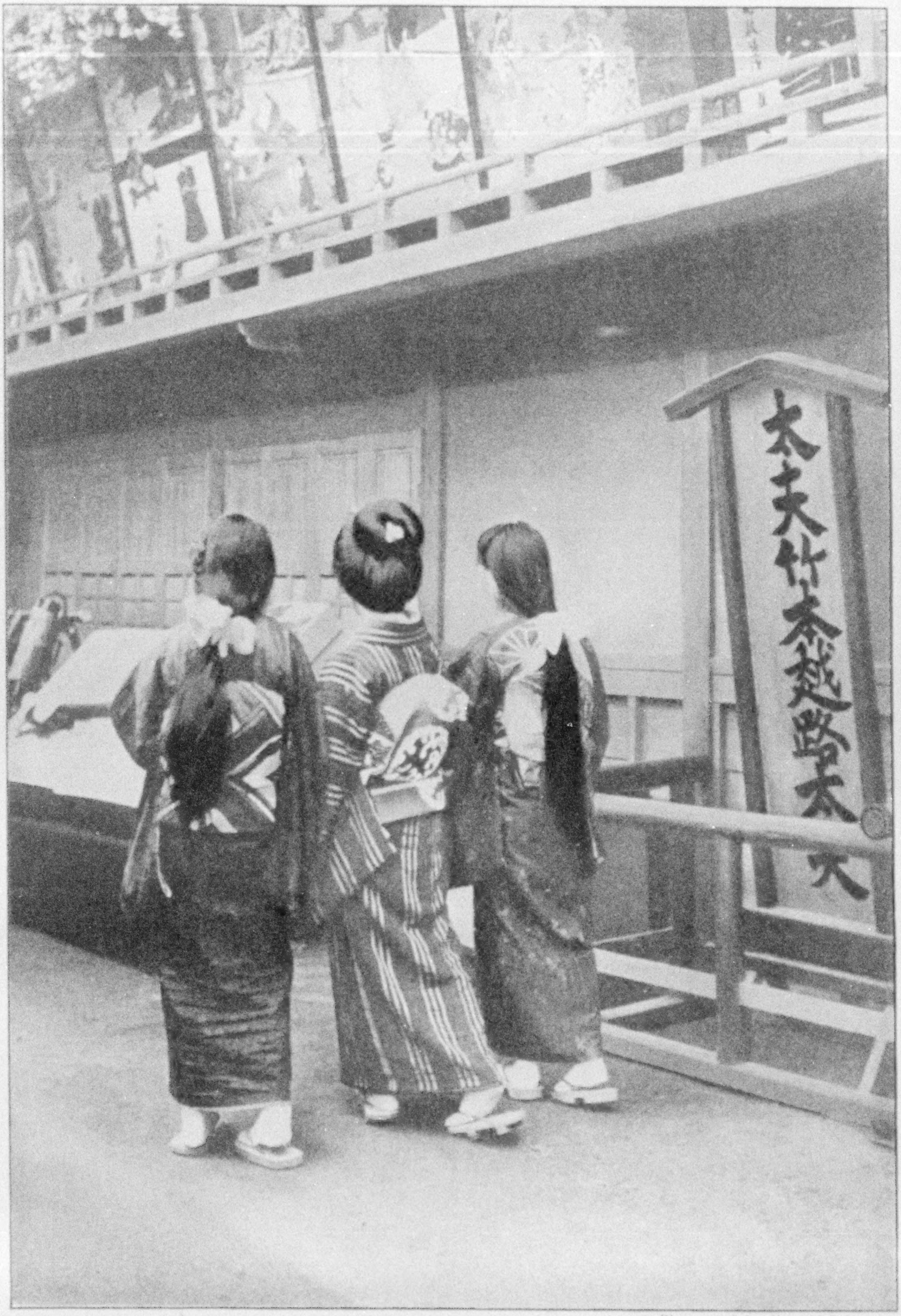
As the young people of America hunt for chestnuts in the fall, the young folk of Japan organize festive "Matsudake" parties. They carry their musical instruments with them in their rambles among the hills and not infrequently Geisha girls accompany the merry-makers, giving their rhythmic dances to the accompaniment of drums, flutes and the guitar-like shamisen.



Photograph by Kiyoshi Sakamoto

"THE WILD CHERRY BLOSSOM REPRESENTS THE SPIRIT OF THE TRUE JAPANESE"

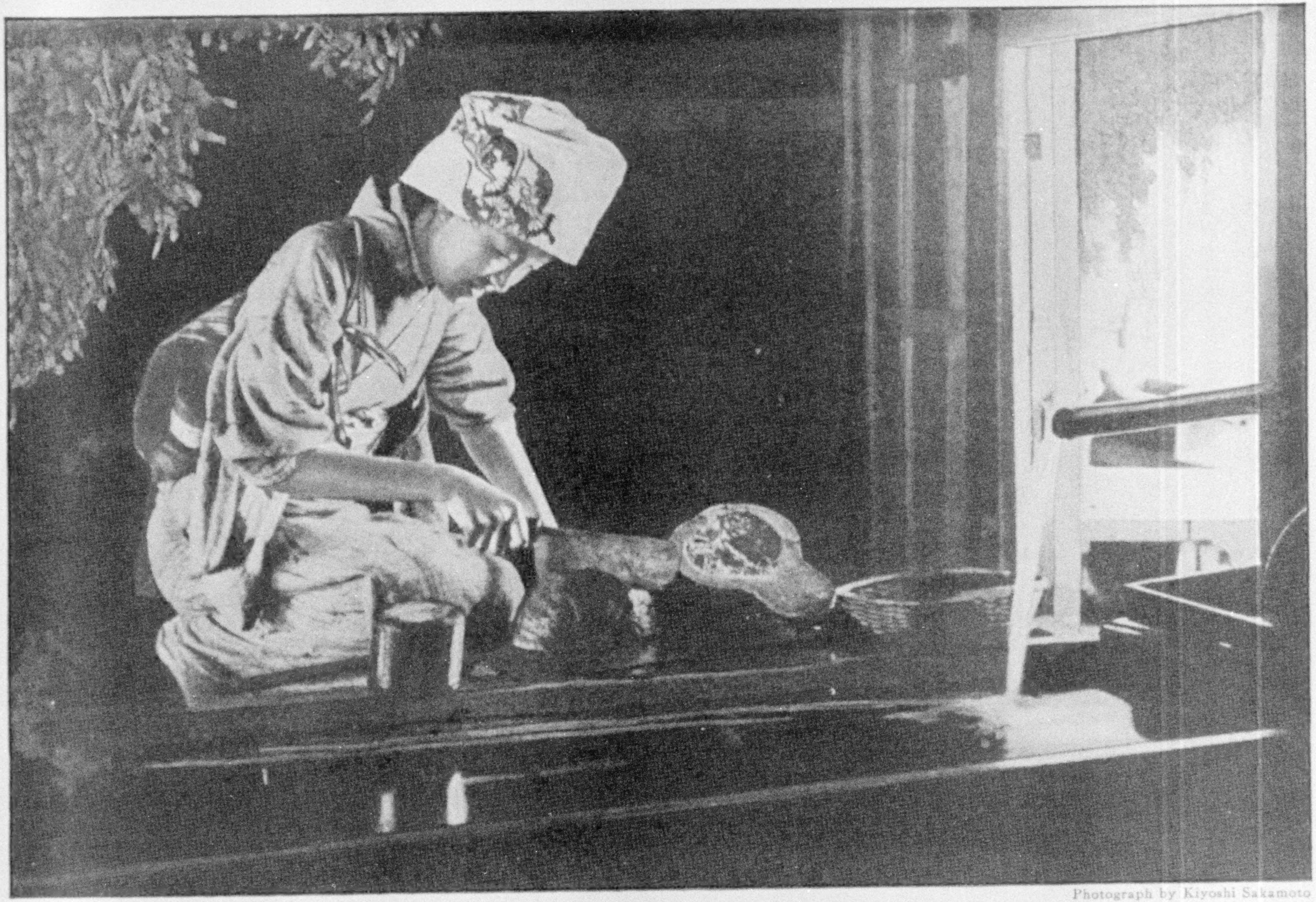
'When in spring the trees flower," sings a poet of old Japan, "it is as if fleeciest masses of cloud, faintly tinged by sunset, have floated down from the highest sky to fold themselves about the branches."



Photograph by Kiyoshi Sakamoto

THE MATINEE HAS ITS LURE FOR THE JAPANESE MAIDEN AS WELL AS FOR MISS AMERICA

These three devotees of the theater are on their way to a performance advertised by the hand-drawn posters seen at the top of the illustration, and the name of the star, Tayu Takemoto Koshiji, is blazoned on the panel at the right.



Photograph by Kiyoshi Sakamoto

PREPARING A PUMPKIN IN A JAPANESE KITCHEN

Dainty Mrs. Nippon does not practice pie-making; she chops her vegetables into bits the size of a match box and boils them. About her head she wears a figured tenegui, the oriental variant of the American boudoir and dust caps, which she will remove before she sits down to dinner or meets a guest at the door.

sacred to them; for he, being deaf, could not hear the summons thither. And so his worshipers seek to cheer him in his loneliness by their own infectious merriment.

It is a natural instinct of the human heart to feel that this act must be acceptable to the object of its most unfettered rejoicings: *"Let us come before His presence with thanksgiving and show ourselves glad in Him with psalms."*

JAPAN PRODUCES 4,000 VARIETIES OF RICE

It is impossible to get a clear idea of the life of rural Japan until we realize the all-importance of the rice crop to the nation at large. Two-thirds of the cultivated land is devoted to it, and no less than 4,000 varieties are produced, while, as we have seen, it is the sowing, transplanting, and ingathering of it that form the chief occasions of popular solicitude and rejoicing.

Until, at the Restoration, in 1868, the Daimyo, the old feudal lords, retired into private life, their incomes were paid in rice, and to-day the peasants pay their rent in the same commodity.

Only when we have wandered observantly off the beaten tracks and listened to the chance scraps of conversation among the country-folk in the summer months, and heard most of it bearing on the state of the crops and the probable prices ahead, can we appreciate what the precious grain means, even in these days of growing industrialism, to the people of Japan.

Japan is not only the third most important rice-producing country in the world, but its rice stands first in quality. In its cultivation all is carried out according to the strictest rule, with a conservatism born of experience. The sowing, for instance, *must* take place on the 88th day of spring, the first day of which is also New Year's Day.

Before sowing, the seed is soaked in salt water for a week, washed in fresh water, and then dried, after which it is planted in well-watered "nursery" beds. About the end of May it is transplanted into "paddy" fields in small bunches about a foot apart, an operation employing hundreds of thousands of men and women knee-deep in water and mud.

This is an occasion of great rejoicing and is celebrated with special songs, known as *ta-ue-uta*—"rice-field planting songs."

THE MOST MOMENTOUS PERIOD OF THE YEAR

The most momentous period of the whole year, however, comes at the end of August or the beginning of September, when the *ni-hyaku-toka* draws near—the "two hundred and tenth day"—for it is the ten days which then follow that form the season of intensest anxiety, of mingled hopes and fears, through which the bulk of the population of Japan passes from year to year.

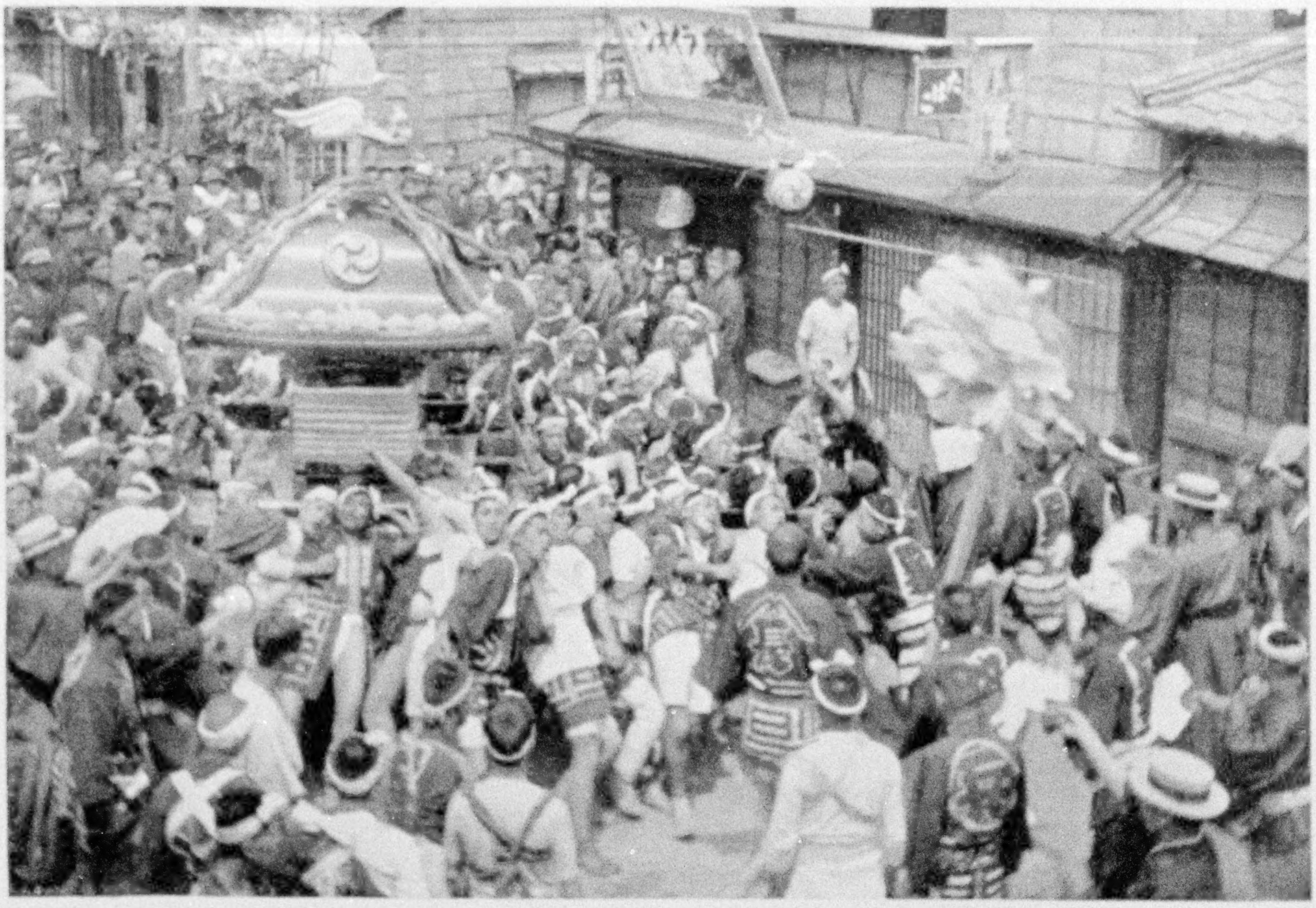
The rice is then ripening fast, and it is a gentle breeze that is urgently needed, although it is just at that precise moment that there is usually the gravest peril threatening, in the dread typhoon, which not only marks the break-up of summer, but incidentally the breaking up of much else.

With the ripening of the various crops in their proper seasons and with the birds and countless varieties of insects in which Japan so abounds eager to prey on them, the fields are dotted over with little flags of bamboo and paper inscribed with charms against their depredations. These are called *mushi-yoke* — "vermin-dispellers"—and are bought at shrines of repute all over the country.

"THE HONORABLE LITTLE GENTLEMAN"—THE SILKWORM

Next in importance to rice come the silk and tea industries, which furnish revenues of some $100,000,000 and $25,000,000 respectively, silk being produced mainly in central and tea in central and southern Japan.

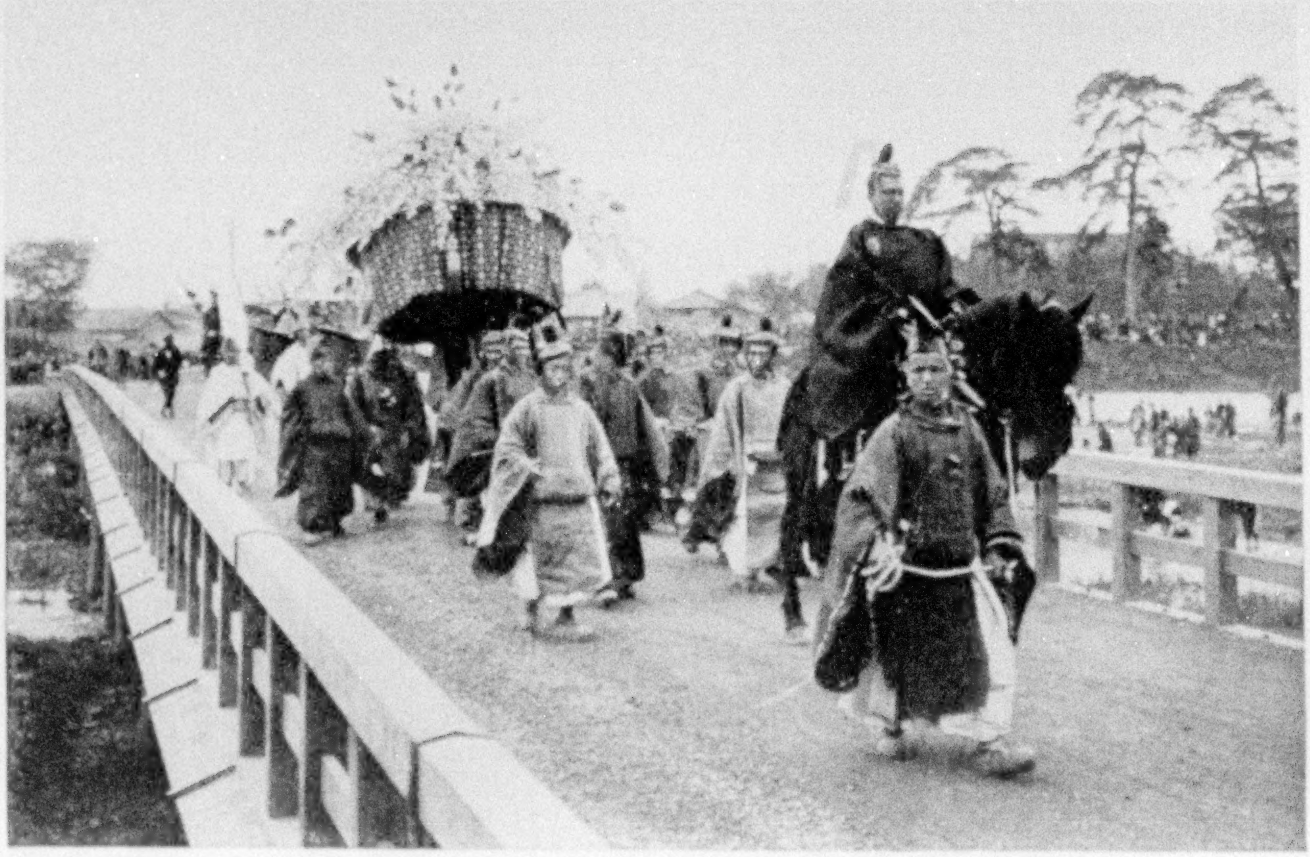
There are many features of peculiar interest connected with the cultivation of silk, of which not the least is the treatment of the precious worm itself. It is popularly called *O ko sama*—"The honorable little gentleman"—and during the period of his "intensive cultivation," mainly the month of August, the satisfaction of his voracious appetite keeps whole households occupied day and night, to the exclusion of all else.



Photograph from Jill Jones

A PORTABLE FESTIVAL SHRINE CARRIED BY JAPANESE LADS

Out of the agricultural life of the countryside have grown those festivals which the people celebrate with the greatest zest and enjoyment.



Photograph by Kiyoshi Sakamoto

ANCIENT COSTUMES AND THE FLOWER UMBRELLA USED DURING THE AOI FESTIVAL

This festival is held every year in honor of the Tokugawa Shoguns, who were for 250 years the *de facto* ruling power in Japan. The "aoi," or wild ginger leaf, appears on the crest of the Tokugawa family.

The leaf-strewn trays, arranged in tiers, fill nearly every room in the house, and the sound of the ceaseless nibbling of the countless myriads is precisely that of the scratching of a thousand pens in the great hall of a college or university on an examination day.

It is believed that any harsh or noisy, ill-bred conduct on the part of persons within earshot of the little creature will seriously affect the quality of the silk produced.

SUGARLESS TEA

Of tea, the national beverage of Japan (drunk always without sugar or milk), we cannot speak in detail. Like most good things in Japan, it was introduced from China about 800 A. D., and for one thousand years its use was almost confined to the aristocracy and the court. It is picked after three years' growth of the plant and is nearly all consumed in the country, with the exception of some fifty million pounds exported to Canada and the United States.

Not the least interesting of one's acquaintances in rural Japan is the country policeman — ever ready to act, when needed, as guide, philosopher, and friend—upon his lonely beat. Some years ago he received the following counsels from police headquarters for the benefit of the unsophisticated of the countryside, the unconscious humor of some of these admonitions suggesting that the person who drafted them did so somewhat feelingly:

"No criticisms should be made, either by gesture or words, regarding the language, attire, or actions of foreigners.

"Foreigners are most sensitive regarding cruelty to animals; therefore special attention should be given to this matter.

"If a foreigner pulls out his watch and looks at it, you should think that he has business elsewhere, and that it is time for you to leave.

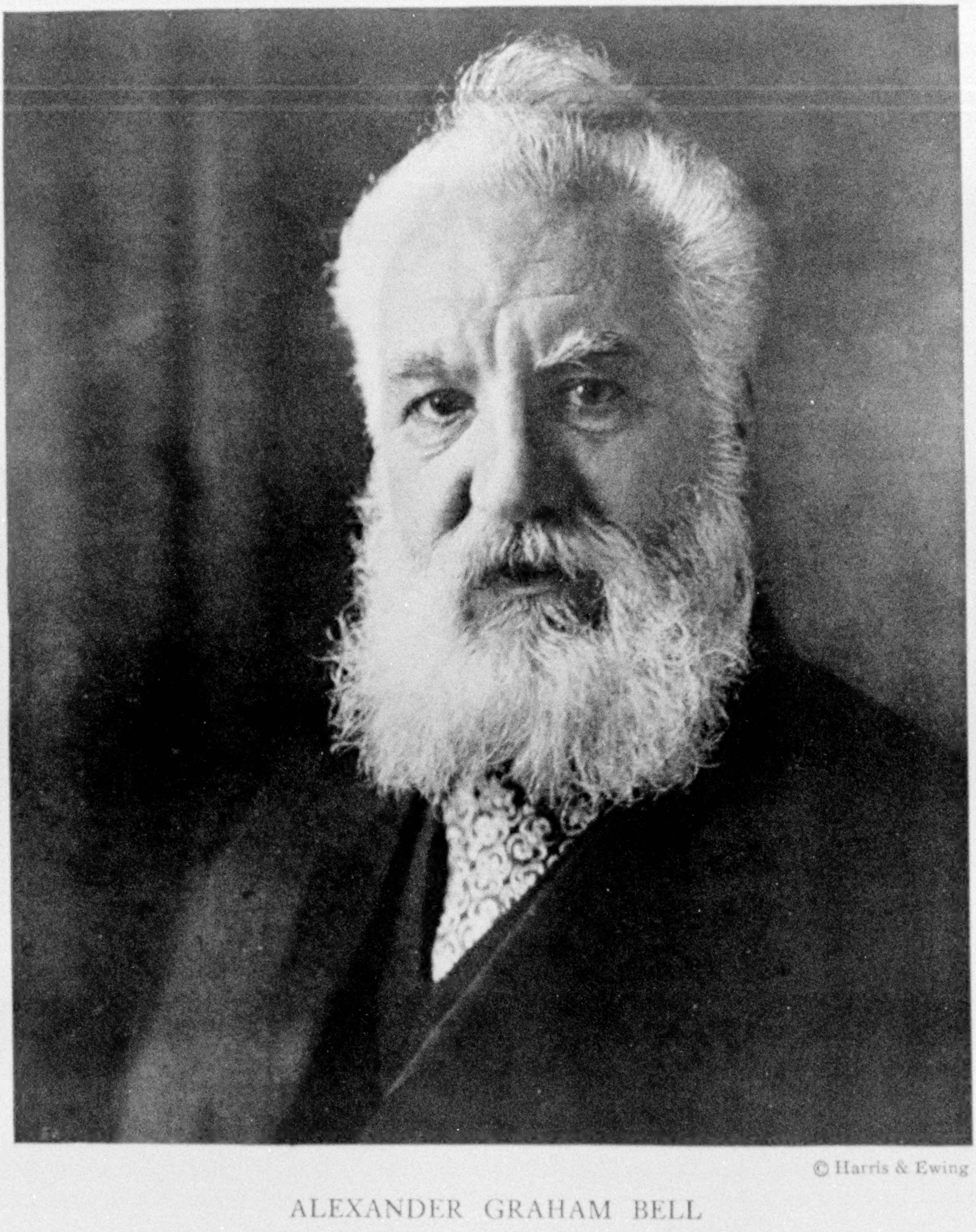
"It is a mistake to suppose that a foreigner will always respond to a request for a loan of money."

During one of my explorations in the Japanese Alps I met a little policeman—the exact circumstances need not now be specified—who insisted on sharing my little room in the primitive hut where we spent several nights. He also insisted on sleeping on the floor, underneath my hammock, which I had slung to a convenient beam in the roof. And yet when I chanced to roll out during my sleep he made no further reference to this startling interruption than to murmur a word of polite apology: *"O jama wo itashimashita!"*—"I am so sorry to have been in your honorable way!"

At the close of the paper contributed to The Geographic for July, 1921, I spoke of the strange contrasts that may often be met with in modern Japan and which cause one almost to rub one's eyes and ask whether we are living in the twentieth century or the tenth.

Since those words were written a curious illustration of this has come to my knowledge. Near the famous Naval Yard of Kure, in southern Japan, a ceremony was recently held for the souls of departed bullocks! One hundred oxen, gaily garlanded, were led in solemn array to one of the chief Buddhist temples, where suitable prayers were said on behalf of their departed comrades. This was followed by instruction in the Buddhist scriptures, and finally they were given a grand feast by their masters, who apologized for all the unkind things they had done to them!

A mile away Japan was building one of the biggest battleships in the world!



© Harris & Ewing

ALEXANDER GRAHAM BELL

1847—1922

SCIENTIST PATRIOT EDUCATOR

The Board of Trustees of the National Geographic Society, with profound regret, announces to the membership the death of Dr. Alexander Graham Bell, a founder, former president, and senior trustee of The Society. Dr. Bell died at Baddeck, Nova Scotia, August 2, 1922.

GILBERT GROSVENOR,
President.

MAP-CHANGING MEDICINE

By William Joseph Showalter

Author of "The Panama Canal," "The Countries of the Caribbean," "Redeeming the Tropics," "How the World Is Fed," "Exploring the Glories of the Firmament," etc., in the National Geographic Magazine

THREE announcements of almost unprecedented import to mankind are expected to be made at no distant date.

The first of these, chronologically, at least, will be that yellow fever has at last been banished from the face of the earth, and that the germ which causes it has become extinct, along with the dinosaur, the dodo, the great auk, and the passenger pigeon.

The next in order will probably be that hookworm disease, which has been called "a handmaiden of poverty, an associate of crime and degeneracy, a destroyer of energy and vitality, a menace and an obstacle to all that makes for civilization," and which is endemic in a zone that embraces half of the earth's population, can be driven from any community which has the will to get rid of it.

Last, but not least in importance, will come the statement that large-scale demonstrations have proved that malaria can be eradicated from almost any community that has enough vital force left to push a thorough, though inexpensive, campaign for its extirpation.

These history-making announcements are safely forecast by an examination of developments in the world-wide warfare on disease being waged by the sanitarians of the world under the leadership of such agencies and institutions as the United States Public Health Service, the health departments of the several States, the British Schools of Tropical Medicine, the India Office, the Dutch Institute for Tropical Medicine, and the French Institute of Colonial Medicine.

PREVENTIVE MEDICINE'S GREAT VICTORY

In all the stirring story of man's effort to make himself master of his environment, there is not a more thrilling chapter than that which tells of the bitter battles he has waged for the conquest of contagion, and of the ground he has won in his struggle with his relentless and innumerable, though invisible, foes.

The World War served to demonstrate that the tyranny of the pathogenic or disease-producing germ can be conquered.

Straining every nerve for victory, the nations that faced the foe from Bagdad to Bruges had to make sure that epidemic disease should not attack the firing line from the rear. Consequently, half-way and temporizing methods were taboo and preventive medicine had free reign.

REMARKABLE CONTROL OF EPIDEMICS DURING THE WORLD WAR

The results were amazing. Although never before in human history was there such an intermingling of peoples, such a crossing and recrossing of seas, such an invitation to contagion to spread to the ends of the earth, only one epidemic succeeded in breaking the barriers erected by the sanitarians.

And as if to emphasize man's power to master the major contagions, not one of those with which the world's public health officials were familiar escaped from the regions where it was endemic, while influenza, which was a stranger, broke away and swept over the face of the earth.

India was a hotbed of smallpox. Nine millions of its population were vaccinated, without a single death therefrom, and the disease no longer threatened that land's participation in the war. The Philippines contained enough cases of the same scourge to set the whole world aflame. Millions were vaccinated there, again without the death of a single person, and smallpox disappeared. Typhus, likewise, was practically held to lands where it existed before the outbreak of hostilities.

Conditions in the trenches were such that the battle lines of France might well have become an inferno of infection; but preventive medicine stepped in and held typhoid fever, malaria, and other communicable diseases in check in a way that was startlingly effective.

It was natural, therefore, that when peace came again the lessons of preven-

Photograph by Earle Harrison

BOYS OF WESTERN MARYLAND, WHERE A GREAT HEALTH BATTLE IS TO BE WAGED

Washington County, Maryland, of which Hagerstown is the county seat, is about to be made the greatest field laboratory for preventive medicine in the world. It is a typical, prosperous American community of sixty thousand, equally divided between rural and urban population. The agencies supporting the work will investigate all epidemics, frame rules for their elimination, provide a staff of visiting nurses, and coöperate with the local physicians to make this the country's model of what a community should be in matters of health.

XUM

TWO
BIGGEST THINGS
IN THE SOUTH
ME
AND
THE LEE COUNTY
MODEL HEALTH
CAMPAIGN

USING THE ELEPHANT TO ADVERTISE GOOD HEALTH IN LEE COUNTY, MISSISSIPPI

After the people of this county saw the benefit of "unhooking the hookworm," they decided to wage war on infectious diseases in general. Even the circus elephant was pressed into service to proclaim the importance of the campaign.

tion and sanitation learned during the World War should have driven themselves home in the minds of those who think in terms of world welfare. Taught that epidemic diseases, which plainly constitute the major menace to civilization in peace times, can be mastered, the sanitarians threw themselves into the fray with redoubled energy.

Casting about in the early days for the best pathogenic foe to attack in a great after-the-war campaign for international health, many of these agencies decided to concentrate on hookworm disease. For here was a human ailment sapping the strength of hundreds of millions of people throughout the frostless belt of the earth—a principal cause, indeed, of their individual and collective exhaustion.

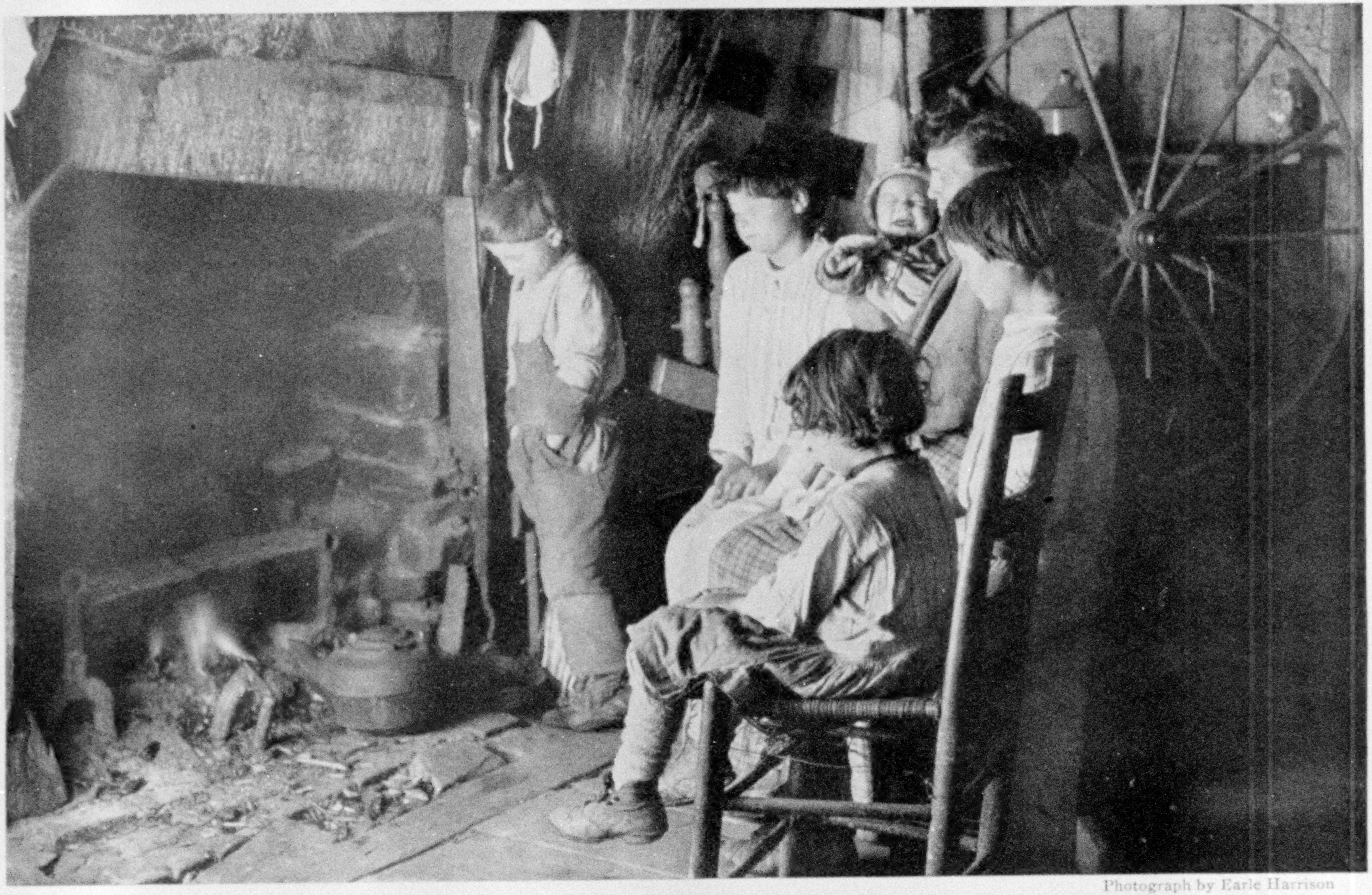
No other disease is as easily cured. The demonstration both of its cause and elimination was amazingly simple: a dose, say, of Epsom salts, a dose of thymol, another dose of salts, followed by the elimination of scores and even hundreds of life-sapping worms.

The effect on the patient was so beneficent that he who ran might note it; the result to every community in which the work was undertaken was that the public acclaimed its success, and made ready to carry the campaign forward with its own funds; the outcome was that, having begun a war on the hookworm, communities gradually found it worth while to extend the campaign to other forms of infection, and to sanitation in general.

Tetrachloride of carbon, a simple and popular "cleaner," has recently been tried with marked success as a substitute for thymol, but whether it will become the favored vermifuge in hookworm removal depends on further tests.

HALF THE PEOPLE ON EARTH LIVE IN THE HOOKWORM ZONE

Reaching as far north as the latitude of Nashville, Tennessee, and Osaka, Japan, and as far south as that of Valdivia, Chile, and Wellington, New Zealand, the hookworm zone of the earth embraces more than half its population.



Photograph by Earle Harrison

A MOUNTAIN HOME IN GEORGIA

There is nowhere a purer strain of colonial American blood than one finds among the mountain whites of the South; yet hookworm infection took its unceasing toll of their vitality until they had lost most of the vigor of their ancestors. Hookworm eradication among them has already worked wonders.

It is within this zone that most of the world's backward peoples live, and there is much ground for saying that perhaps the chief part of their backwardness is due to the cumulative effect of the disease—physical, economic, intellectual, and moral—upon the race.

More serious, indeed, than the high mortality rate among individuals of the living generation is the accumulating deterioration of the race, due to poverty and its consequences, transmitted to future generations.

When operating in conjunction with that other microscopic monster, the malaria germ, the hookworm is doubly an evil, and both diseases reach their highest development in the same environment—the hot, damp regions of the earth.

The malady caused by the hookworm is one of the most serious of the disabling afflictions to which mankind is subject. It affects fundamentally the welfare of humanity over vast and populous regions, lowering the victims' resistance to other infections, dulling the mind, sapping the strength. Its effects express themselves in stunted mental and physical growth and lead to degeneracy and decay.

With its onset insidiously gradual, it is far less spectacular than smallpox or yellow fever; but the deaths directly or indirectly traceable to it are higher in percentage than those traceable to almost any other disease except tuberculosis. As a slow-acting cultivator making the human system a fertile field for the grim sowers of fatal infections, it is, perhaps, with the exception of malaria, the world's outstanding malady.

MAKING THE HOOKWORM PREACH SANITATION

Yet, owing to the fact that its every stage is so well known, that the methods of combating it are so dramatically effective, and that those who are cured so quickly begin to experience the joys of living once more, it makes itself the most readily and successfully used of all diseases with which to point a community toward a goal of better health.

As stated previously, a dose of Epsom salts, castor oil, or other purgative, a dose of the oil of thyme, or chenopodium (the former from a plant that grows in our gardens, and the latter from one that is a cousin of the common lamb's quarter), followed by another dose of Epsom salts—and presto! scores and hundreds of small worms are expelled from the system and may be exhibited before the victim's eyes.

Presently the erstwhile victim, relieved of the inexorable board bill of vitality which his hundreds of sponging guests forced him to pay, begins to feel his "pep" returning, his strength coming back, and his whole life being transformed from a dragging existence into a quick-stepping, energetic activity.

These dramatic results, widely attained, constitute such a convincing "before" and "after" exhibit that doubting Thomas himself is made to believe, and even the backward community that still doubts the efficacy of vaccination against smallpox, that still pooh-poohs the value of water-purification against typhoid, that still believes tuberculosis is hereditary and not infectious, becomes a center of enthusiasm for hookworm-control.

SEED THAT HAS BEEN WELL SOWN

The hookworm, therefore, lends itself admirably to the cause of community sanitation, as the entering wedge through which the shackles of fogeyism are broken, and through which an opening is made for that faith and coöperation which is the very foundation stone of preventive medicine.

To-day those Southern States' communities whose health organizations took up the anti-hookworm war have the satisfaction of knowing that hookworm disease has been greatly reduced, both in severity and prevalence; that the people have been enlightened as to its importance, its relief, and the means of its final control; that permanent agencies committed to its elimination have been rooted in the soil; and that a sustaining public sentiment has been created in the interest of more general measures for the better protection of the public health.

Through the spirit of health progress thus created, legislative appropriations for public health purposes in the South have increased more than 500 per cent during the past decade; full-time county health organizations are being developed; and,

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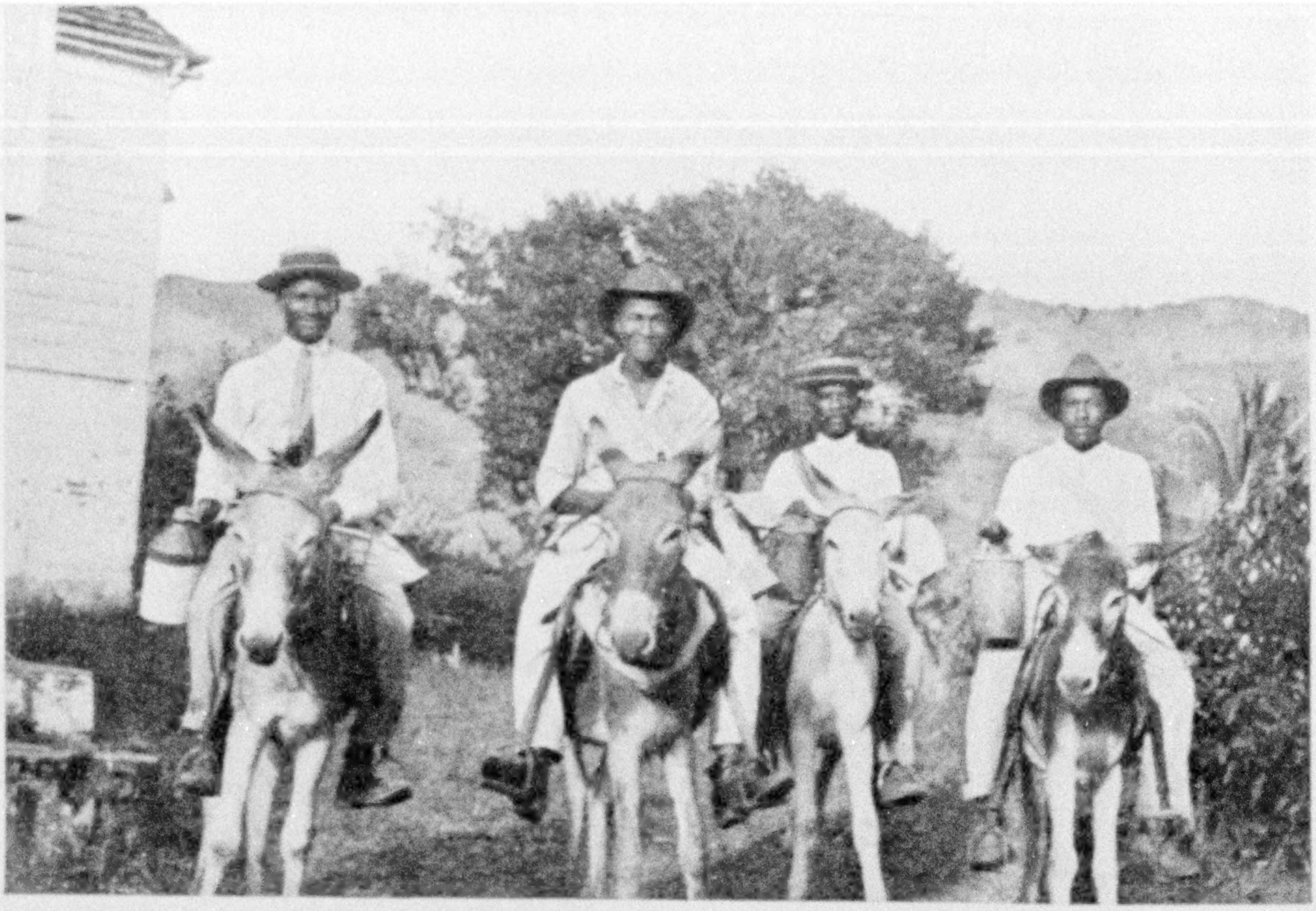
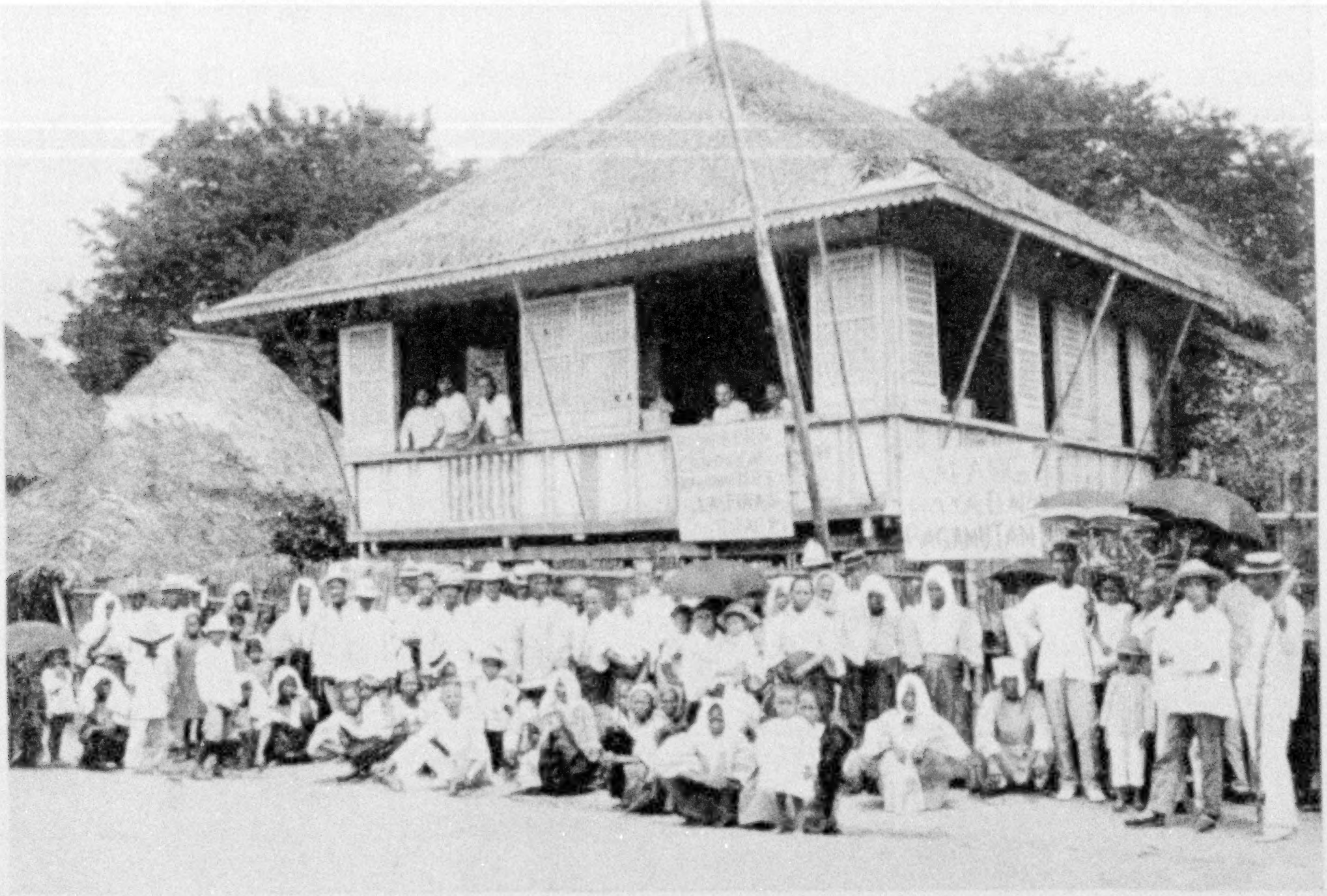


AN ANTI-HOOKWORM SQUAD IN BELAIR, ST. VINCENT, BRITISH WEST INDIES

LABORATORIO
RA EL EXAMEN Y TRATAMIENTO GRATIS
UNCINARIASIS
ANEMIA TROPICAL

AN OFF DAY AT A NICARAGUAN HOOKWORM LABORATORY

Any one who has traveled through tropical countries can appreciate what a vast need there is for freeing the millions of people who dwell in the hot lands from the health-sapping, strength-draining dominion of the hookworm.



Photograph from the Philippine Bureau of Science

AN OUTPOST IN THE WORLD WAR AGAINST THE HOOKWORM: LAS PINAS, PHILIPPINE ISLANDS

American altruism goes to the ends of the earth to offer freedom from infectious diseases to those who will accept its help and guidance.

through a tax-supported health service, state and local, the certain outcome will be the final and complete control of hookworm and other preventable diseases.

How rapidly general sanitation has moved forward in the Southern States under the stimulation of the war against the hookworm is shown by the fact that there are now approximately 131 counties in twelve States which have full-time health departments.

In Virginia the number of cases of typhoid fever was cut from 14,398 in 1909 to 2,493 in 1920. The reduction of the death rate from typhoid fever registered for three years in North Carolina, applied to the United States, would mean an annual saving of 13,000 lives.

A VAST TASK STILL AHEAD

The widespread incidence of hookworm disease is shown by the fact that three out of five persons examined in China have it, three out of four of those in Siam, and five out of eight in various parts of India. It is estimated that two-thirds of the 45,000,000 people of Bengal have the disease, and that more than one-half of the 300,000,000 inhabitants of India are victims of it.

Similar conditions prevail in Brazil, Colombia, Central America, the West Indies, and elsewhere, and if one were to reckon up the total number of the people of the earth who labor under the hookworm handicap it would probably be four or five times as many as there are inhabitants of the United States.

UNHOOKING THE HOOKWORM

In its campaign against the hookworm, one agency prepared, and lends to the various communities fighting disease, a motion-picture film which, with a full appreciation of human interest, it has named "Unhooking the Hookworm." The hatching of the egg, the creature's penetration of the human body, its progress through the blood, lungs, and throat to the digestive tract, its parasitic rôle, and its propagation are set forth vividly by micro-photographic pictures and ingenious animated

© R. Lenz and Co., Bangkok

THE ROYAL PALACE AT PETCHABURI, SIAM

Malaria and hookworm disease, marching hand in hand, have levied a heavy toll upon half of the earth's inhabitants. To-day these twin curses of humanity are gradually yielding ground and are being forced to travel the road of smallpox and typhus.

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Photograph by Earle Harrison

A MOUNTAIN HOME IN THE SOUTH

"So as to be up and around" and "I can't complain" were the usual answers to inquiry about one's health in the mountain sections of the South before the war against the hookworm; for few could ever say, "I am feeling fine." There is no physical or mental vigor or joy of living among those who harbor hookworms.

A WEST INDIAN NEGRO WOMAN WHO IS PROUD OF HER HEALTH CERTIFICATE

designs, successive scenes illustrating the causes of soil pollution, the process of infection, the symptoms of the disease, the methods of treatment, the results of cure, and the need of sanitary precaution. The film is being exhibited to-day under some twenty different flags.

SUCCESS GREATER THAN WAS ANTICIPATED

For a long time it was believed that hookworm disease could not be reduced to a stage where it would be harmless, without completely successful efforts to prevent soil pollution.

Resurveys of various areas in the South, in Porto Rico, and elsewhere, where community treatments had been administered, showed a gratifying reduction in the percentage of people infected, but not enough to promise the extirpation of the disease.

But, on a reëxamination of those previously treated, the percentage, based on the number of worms found, was shown to be vastly lower than the percentage of those completely free from the invaders.

Richmond County, Virginia, where the war on the hookworm as a world-wide fight had its inception, stands out as an example of what may be accomplished and as an evidence that it can be accomplished with much less difficulty than was formerly supposed.

When the work began there, about thirteen years ago, 82 per cent of the people had the disease. A few years later a resurvey showed that this had been reduced to 35 per cent. A more recent resurvey reduced it to 2 per cent, and in 1922 it can be announced that there is not a single person in the entire county in whose body the worms are numerous enough to produce any of the symptoms of the malady.

THE WAYS OF THE NECATOR

There are two kinds of hookworms that invade the human body, an Old World species known as *Ancylostoma duodenale* and the "New World" form known as *Necator americanus.* The latter was described by Dr. Charles Wardell Stiles in 1902, and it was through his efforts that the South first came to realize the great drawback under which it had to labor as a result of the prevalence of the disease.

Some years ago specimens of the "American" species were found in Africa, and it is believed that it was imported to America with negroes, in the days of the African slave trade. It is interesting to note that the negro is far less susceptible to the disease than either the white man or the Indian, just as both the malaria and the yellow-fever mosquito show a preference for biting white folks. In British Honduras, in Barbados, and in other communities where large black populations live, the whites and the Indians are found to be much more susceptible to its attack than the negroes, both in the number of worms found and in the effect on the individual.

The New World species of hookworm is a small parasitic creature about as thick as an ordinary pin and half as long.

The adult female worm, inhabiting the small intestine, lays thousands of eggs daily. After these pass out of the body they hatch within one or two days. They are microscopic in size when hatched and never grow larger as long as they remain in the ground.

GETTING A "MOUTHHOLD"

Then comes along a pair of bare feet or hands, or some other part of the body touches the infected ground, and the little villains make the most of their opportunity. They promptly begin to bore their way through the skin, causing a severe irritation known as "ground itch." Once under the skin, they travel through the tissues until they come to the lymphatic system, and thence into the blood.

Finally, after passing through the heart and lungs, they reach the throat and pass thence through the stomach, ultimately landing in the small intestine, to whose wall they fasten themselves, and for as much as seven years, if not disturbed by treatment, take their fill of the victim's blood and intestinal tissue.

They develop in their salivary glands a substance that has a marked power of inhibiting coagulation of the blood. Attaching themselves to the surface of the intestinal wall, rasping and sucking away the delicate inner cells on which they feed, they lay bare the deeper tissues, and the wound continues to bleed for a long time, even after the worm has deserted the spot to which it was attached.

But they go even further than that. By some method not well understood, they cause the blood to undergo a change, reducing the amount of hemoglobin—the element that makes us red-blooded, and which constitutes the ingredient that tends to render healthy blood an unfertile soil for the seeds of infection sown there through lack of sanitation. It has been found that in severe cases of hookworm infection as much as 90 per cent of the red coloring matter of the blood is destroyed, and that the number of red corpuscles—the hod-carriers of the human system—may be cut down 50 per cent.

MASTERING THE MALARIA GERM

Even more insidious than the hookworm, and not so dramatically eradicable, is the microscopic animal that causes malaria. In the language of the lamented Osler, "cholera kills its thousands; plague, in its bad years, its hundreds of thousands; yellow fever, hookworm disease, pneumonia, and tuberculosis are all terribly destructive, some only in the tropics, others in more temperate regions as well; but malaria is to-day, as it were, a disease to which the word pandemic is applicable. In this country and in Europe its ravages have lessened enormously during the past century, but in the tropics it is everywhere present, the greatest single foe of the white man."

FOND OF CASTOR OIL

One of the dispensers in Ceylon administering a dose of castor oil before giving oil of chenopodium, in the treatment for hookworm infection. This photograph was labeled "A Thirsty Soul." Many of the natives are particularly fond of castor oil.

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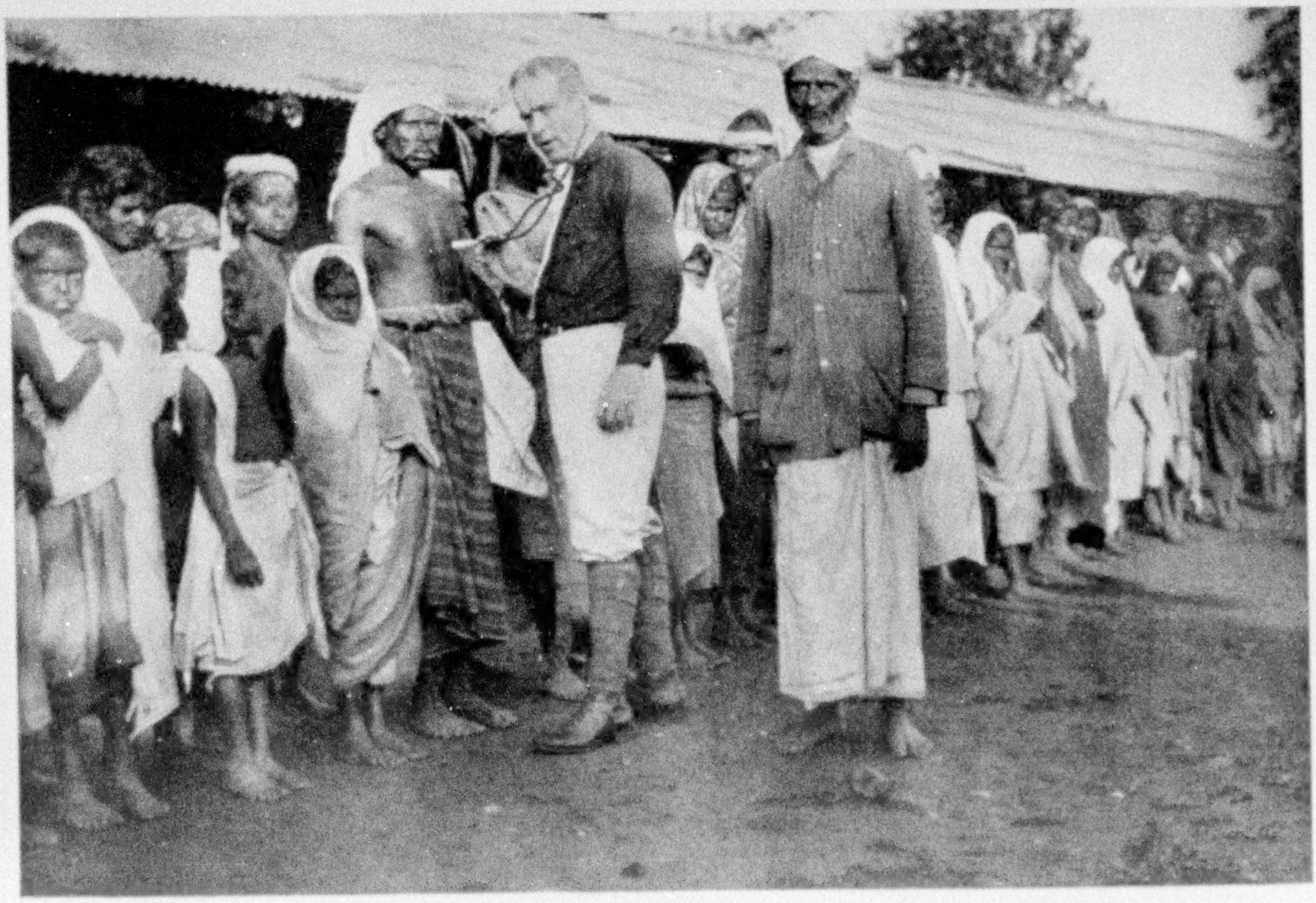
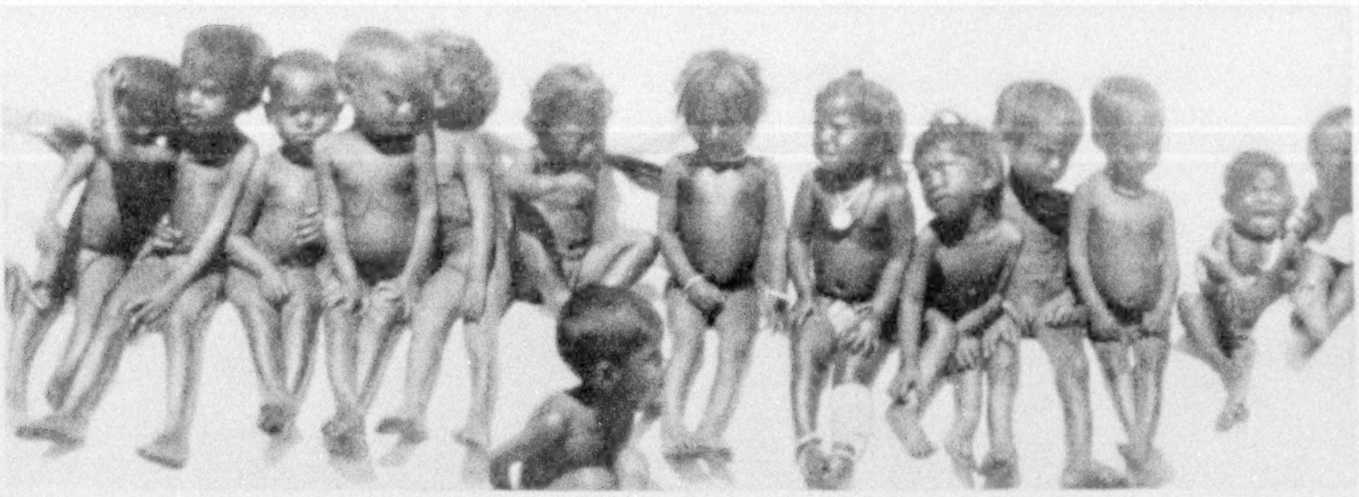
VISITING THE OUTPOSTS OF PUBLIC HEALTH IN CEYLON



HOOKWORM WARFARE IN CEYLON

The man to the physician's left is a "Kangany," who secures laborers for the estate on which he is employed and acts as foreman. He has brought his recruits to the dispensary for hookworm elimination. He knows it pays to have healthy workmen.



A ROW OF HOOKWORM VICTIMS IN CEYLON

All of these Tamil babies, some of them less than a year old, have the disease. No Old Man of the Sea ever rode his victim harder than do these intestinal leeches. The children who harbor them never attain a vigorous adulthood.

If yellow fever can point to pre-Columbian civilizations destroyed by it, and if hookworm disease can lay claim to being a strong factor in making backward that half of the world's people who dwell within the frostless latitudes, malaria can offer evidence that it has helped to make Africa the Dark Continent, that it was largely responsible for the passing of the "glory that was Greece and the grandeur that was Rome," and that today it lays a heavy hand upon the eight hundred millions of people who dwell within areas where it is endemic.

In India alone 1,300,000 people die annually of malaria and 100,000,000 more suffer from its attacks.

All over the world, wherever anopheline mosquitoes dwell, the "ague" is a menace which slays its thousands, renders the bodies of its tens of thousands happy hunting grounds for other pathogenic invaders, and makes its millions less efficient and useful.

It was Major Ronald Ross, the distinguished British army surgeon, who was finally able to pin the crime of spreading malaria on the anopheline mosquito.

Fourteen hundred years before Ross's day those winged villains were under suspicion, and the literature of the disease contains many unsupported charges against them. At length Laveran found the tiny eel-like parasite, which, swimming through the blood, attacks and breaks up the red corpuscles and causes malaria.

Then Ross undertook to find out how it got there. After discussing the subject with Sir Patrick Manson, he set out for his regimental post at Secunderabad, India.

He began to dissect mosquitoes under the microscope. Week after week he conducted his search for the malarial germ in the insect's tissues without result.

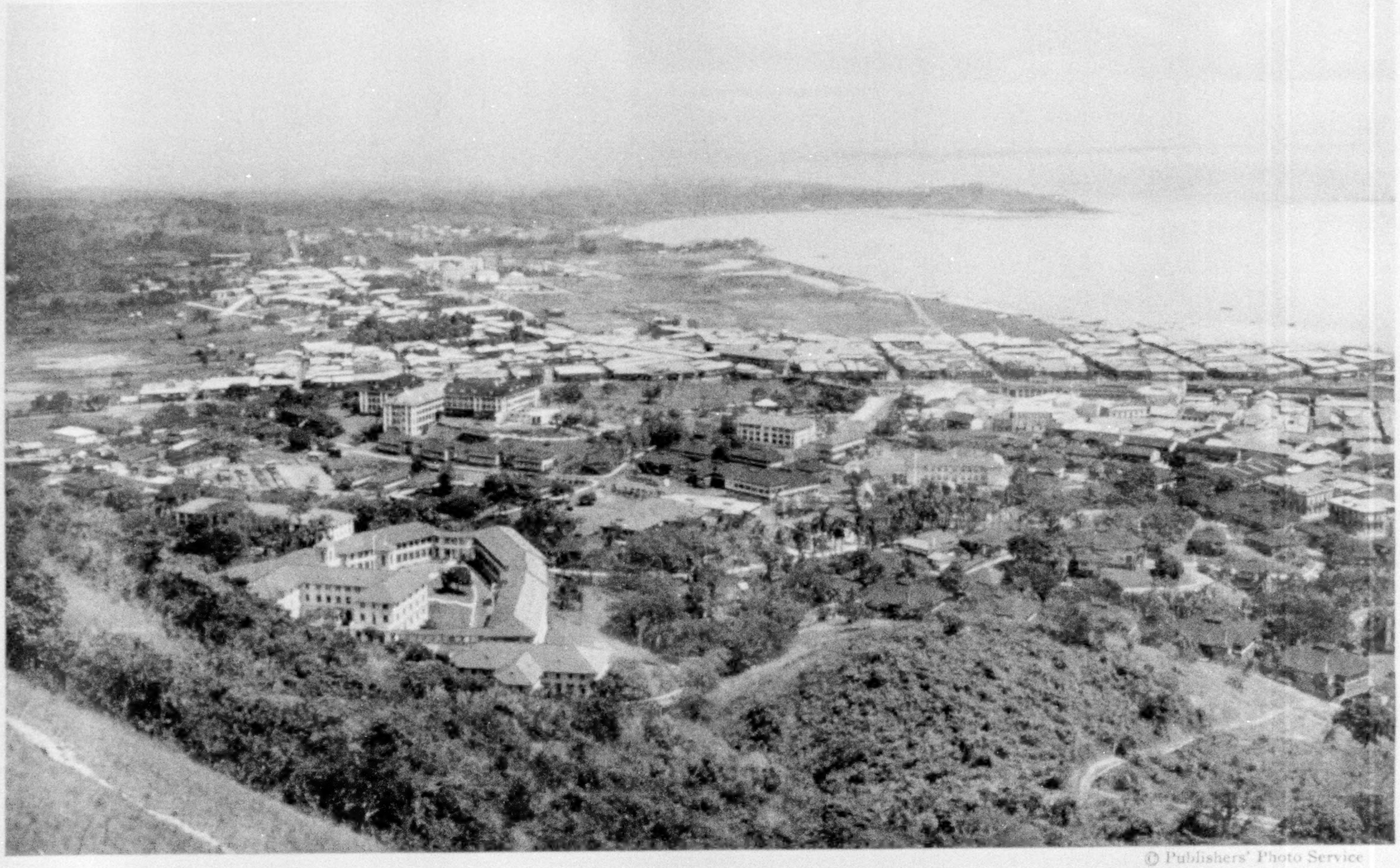
THE MOSQUITO THAT REVEALED THE SECRET

Finally, he had two remaining mosquitoes. Taking one of these, he searched it out part by part, but with intense disappointment, until he came to the "wee beastie's" stomach. There, with his high-power microscope, he found some black specks. He recognized them as the pigment of the malaria germ. After gaining this clue, exhausted, he slept for an hour. Coming back to his work, he used a stronger salt solution in his dissecting operations, and lo, the contents of the pigmented cells no longer consisted of clear fluid, but a multitude of thread-like bodies, which, on the rupture of the parent cell, were poured into the body-cavity of the insect!

From there they entered the salivary glands, and from these reached the blood of the person bitten by the mosquito. In his story of his work Ross exclaims: "Never in our dreams had we imagined so wonderful a tale as this."

Under his leadership, Ismailia, on the Suez Canal, with 8,000 population, set to

XUM



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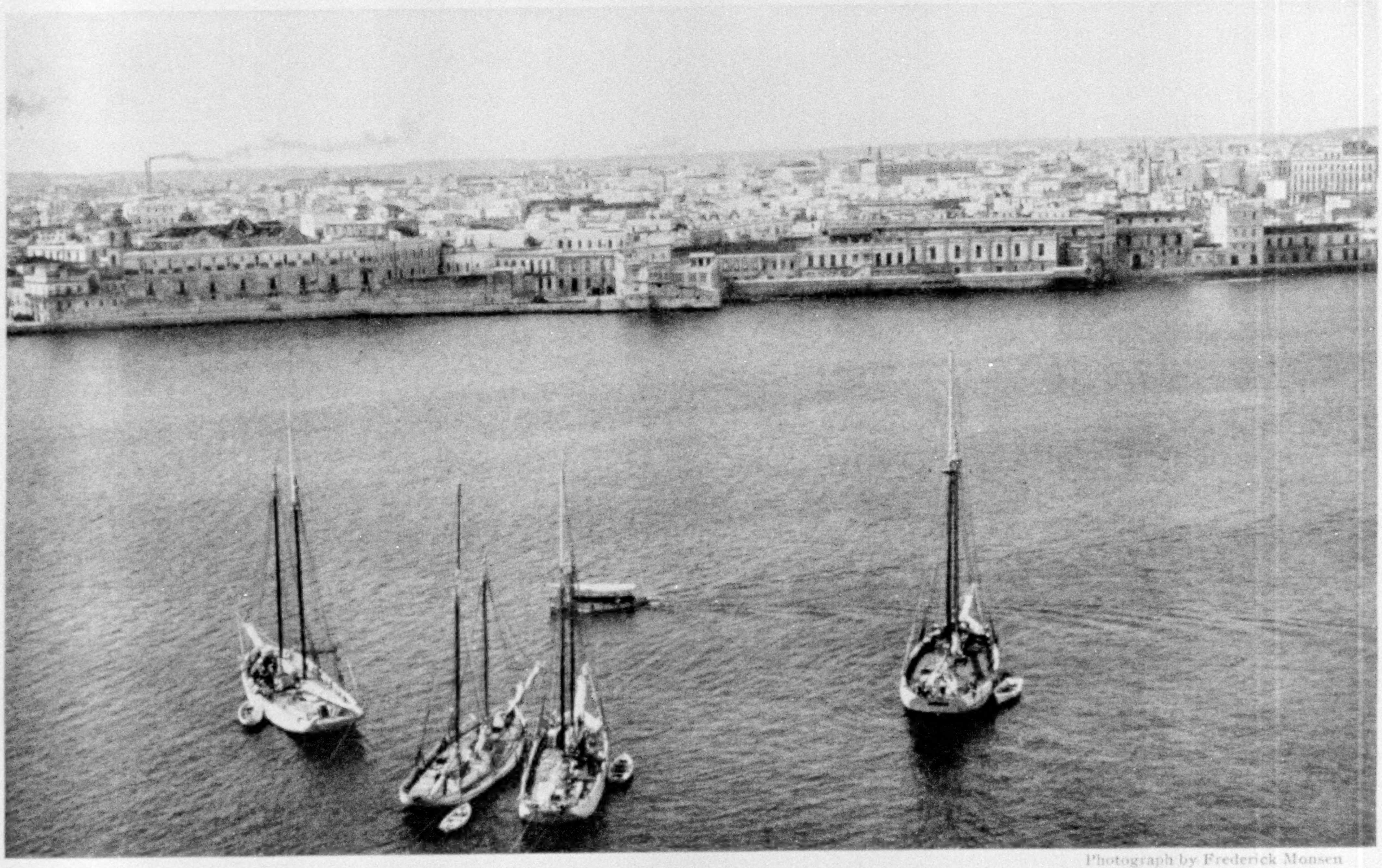
A VIEW OF ANCON HOSPITAL, HOTEL TIVOLI, AND THE NORTHERN END OF PANAMA CITY FROM ANCON HILL, PANAMA

The yellow-fever mosquito, convicted in Cuba, secured a new trial at Panama, and came dangerously near to winning a verdict in its favor in the court of public opinion; but at last the methods employed in Havana proved effectual on the Isthmus and *Stegomyia fasciata* was sentenced by mankind to be perpetually branded as the conveyor of yellow-fever germs.



Photograph by Frederick Monsen

THE CITY OF HAVANA, CUBA, AS SEEN FROM THE HILLS BEYOND THE HARBOR

It was here that Colonel Gorgas, supported by General Wood, effectually applied the lessons of the Reed Commission's yellow-fever investigations and banished yellow fever from the island metropolis, thus marking a new day in municipal sanitation in the tropics.

Photograph by Richard B. Hoit

IN THE HARBOR OF GUAYAQUIL, ECUADOR

The resolution with which the Ecuadoreans attacked the yellow-fever situation and drove the disease from their shores has inspired other countries, from the Equator to the Rio Grande, with the result that yellow fever now has no ground it can call its own.

XUM

work to free itself from malaria. It succeeded so brilliantly that the disease was entirely wiped out.

Panama and a hundred other places have been largely freed from malaria by the application of the principles for its control developed by Ross and his co-workers.

In Italy, under Celli, the war against it brought down the number of deaths it caused from 28,000 in 1888 to less than 2,000 in 1910. In the district of Klang, in the Federated Malay States, Watson succeeded in reducing the number of hospital cases of malaria occurring annually from 334 in 1901 to 12 in 1906. In the Dutch East Indies the Department of Public Works at Sibolga succeeded, through its anti-malaria campaign, in driving down the annual mortality rate from 79 out of every thousand people in 1912 to 18 in 1920.

SIMPLE MEASURES REQUIRED

But preventive measures that will commend themselves to the communities that need them most must be at once extremely simple and very inexpensive—much more so than those employed at Panama and Suez.

The sanitarians who are striving to release the peoples of the earth from the merciless sway of malaria realize this, and many of them have joined forces for the formulation of a program for making any community safe against malaria. This has taken the form of large-scale, community-wide experiments in some of our own Southern States.

The anopheline mosquito is essentially a rural resident, in contrast to the yellow-fever carrier, which prefers an urban situation.

Therefore the malaria problem, in the main, has become, under conditions of modern sanitation, a matter to be dealt with mainly by small towns, villages, and country districts.

With this in mind, a group of villages and countrysides was selected where the various methods of combating the malady would be tested, in some places employing one method, in others another, and in still other communities a combination of two or three, or even of all known methods.

It was demonstrated in many towns and villages in Arkansas and Mississippi that from 75 to 95 per cent of the malaria in a community can be eradicated at an outlay of from 45 cents to $1.00 per capita. So successful were these demonstrations that in 1919 a conference composed of the United States Public Health authorities, members of State boards of health, the directors of the International Health Board, and local health officials decided to make concerted demonstrations in fifty-two towns in ten Southern States in 1920.

THE MOSQUITO BANISHED

The results were astonishing. At an average cost of 78 cents per capita, these fifty-two communities, which had been hot-beds of malarial infection, were largely freed from the disease.

Furthermore, by-products of the campaign were community pride, popular education in sanitation, and widespread interest in health problems.

The measures employed were: simple drainage, filling pits and shallow pools, channeling streams, clearing the margins of streams and ponds, removing obstructions, turning in the sunlight, oiling, enlisting the service of the top minnow, and administering quinine.

In Hinds County, Mississippi, in a countryside campaign, oil and the top minnow were used. They cut out 77 per cent of the cases of the disease at a per capita cost of $2.60 in 1919 and $3.09 in 1920.

The top minnow, *Gambusia affinis*, the female of which is two-thirds as large as a man's little finger, and the male half as big, proved to be such a wonderful annihilator of baby Anopheles that it is considered superior to oil in most cases.

These minnows have voracious appetites, and the baby mosquitoes are the *pièce de résistance* of their daily dinner. In some waters they are able to eliminate 90 per cent of all the malarial mosquitoes before these reach the flying age.

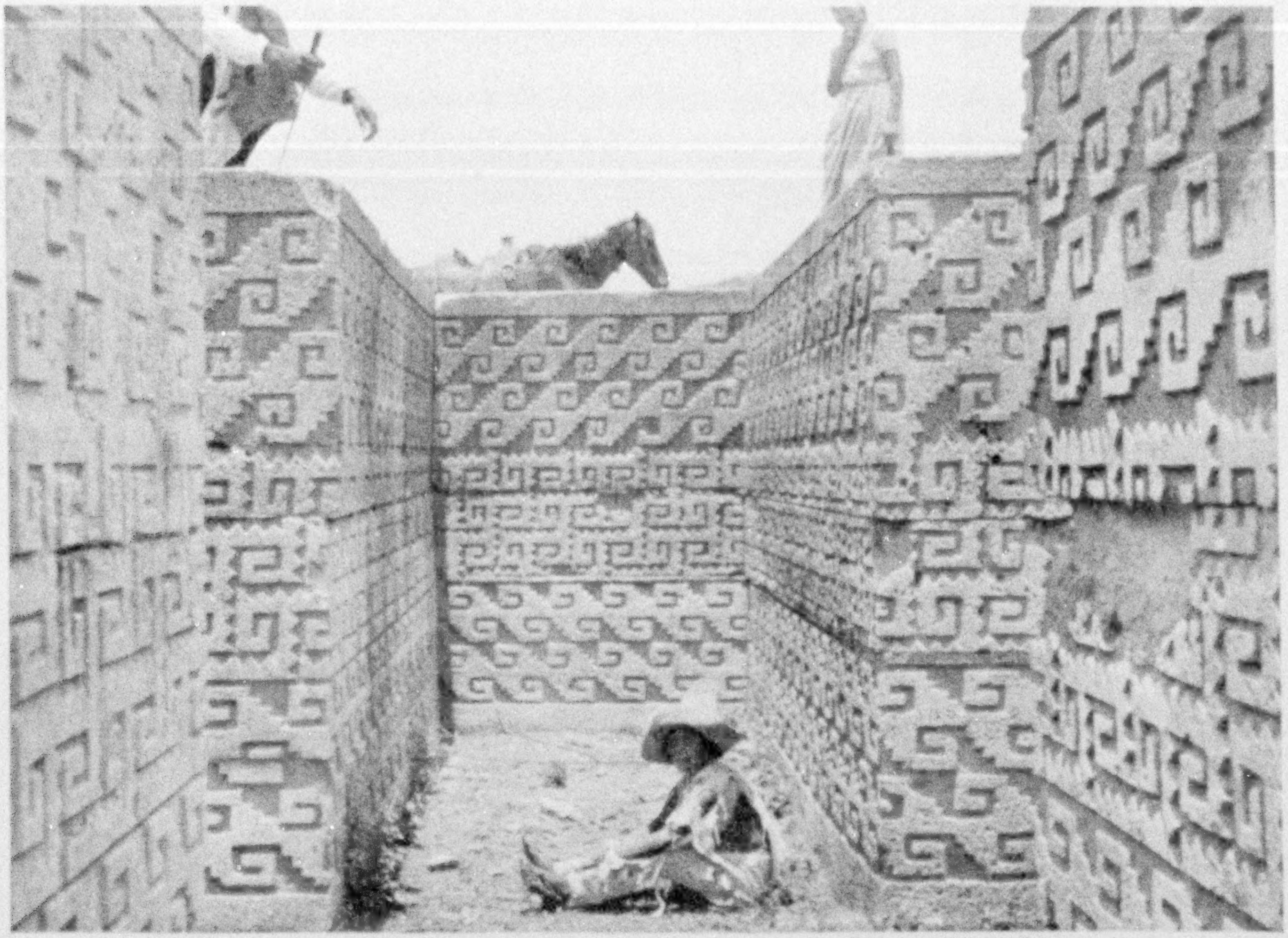
There are some waters where oil can be used to better advantage than top minnows, but in most cases the little fish are masters of the situation.

The fish are inefficient where the banks of the pond or stream are overgrown with vegetation. Here the pasturing of cattle

Photograph by T. Maler, courtesy Peabody Museum of Harvard University

MAYA RUINS AT PALENQUE, MEXICO

In pre-Columbian days the civilizations in Mexico and Central America reached a high state and then died out. Records recently translated show that terrible epidemics occurred. One affliction was known as the when-the-buzzards-entered-the-house disease—an eloquent portrayal of an epidemic so fatal that there were none left to bury the dead. Yellow fever or smallpox is believed to have been the malady thus described.



Photograph by Sumner W. Matteson

AZTEC RUINS NEAR MITLA, MEXICO

Mexico entered into the yellow-fever campaign last year and Brazil inaugurated vigorous warfare on the few remaining sources of infection in that country. These were the last lands where the disease existed. The ruins at Mitla are believed to be mute witnesses to civilizations conquered by the yellow-fever germ (see text, pages 326-327).

helps the situation. It opens up all the water area to the passage of the fish and the latter make the most of their opportunity.

IT COSTS ONLY ONE-FOURTH AS MUCH TO GET RID OF MALARIA AS TO KEEP IT

In six Arkansas towns where malaria control has continued for four years, it has been found that the cost of the disease to the community is four times as great as the cost of banishing it.

In Hamburg, Arkansas, the number of visits paid by doctors to malarial patients fell from 2,312 in 1916 to 59 in 1918 and to practically nothing in 1921.

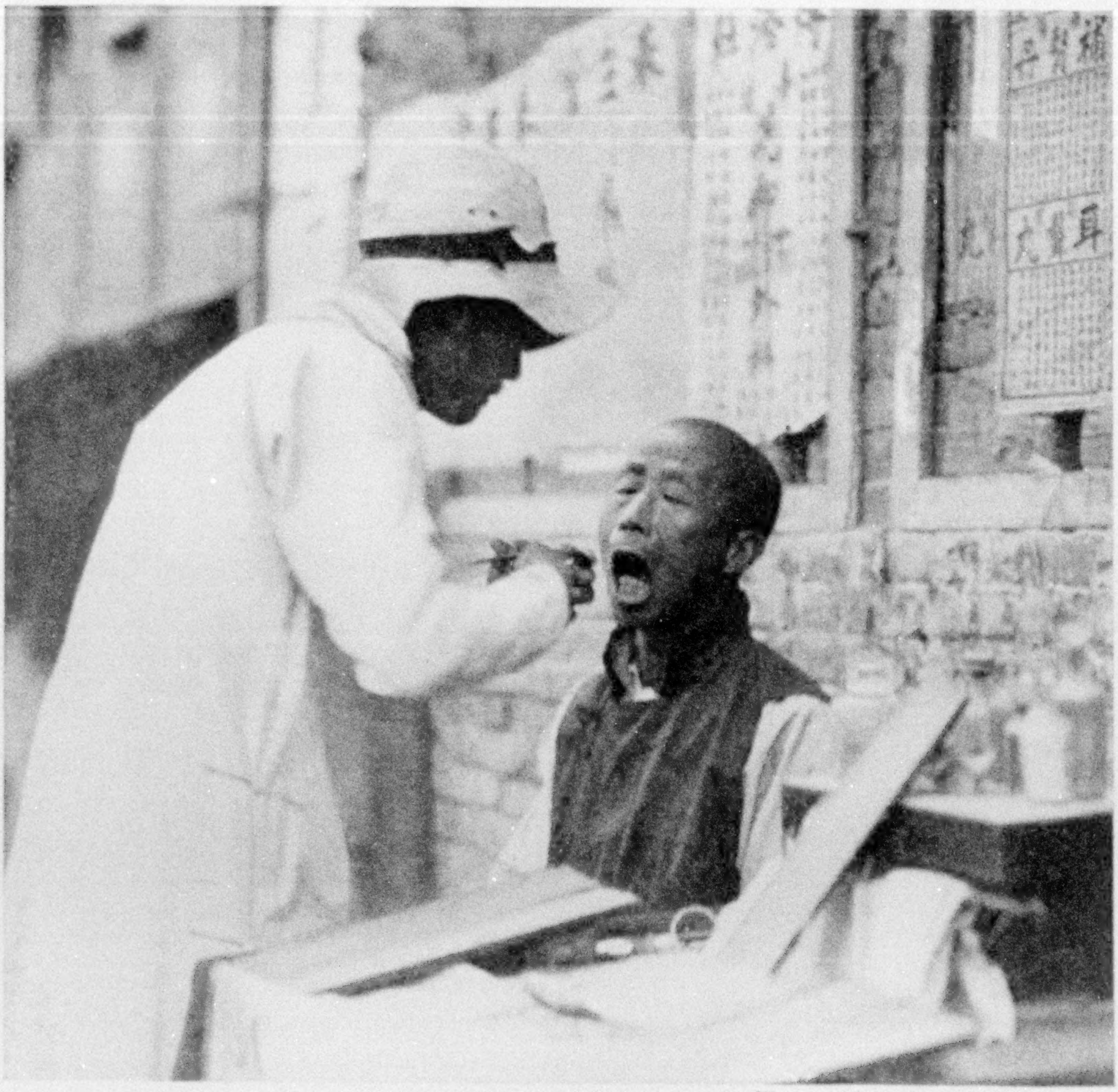
It has been well known that the malarial parasite cannot live in the presence of quinine in the blood. Experiments on a large scale in Mississippi have demonstrated that ten grains of that drug a day for eight weeks kill the parasites in 90 per cent of the cases treated.

Under these large-scale demonstrations the world has had the way pointed out through which it may rid itself of one of humanity's greatest foes—an enemy which, unmastered, annually slays more victims than even the World War claimed in any twelve months.

In the world-wide crusade for the conquest of contagion inaugurated after the close of the World War, yellow fever stood out as an insolent foe that had been defeated in organized warfare, but that had now resorted to sniping and bushwhacking in tropical America and Africa.

How finally to drive it beyond the bounds of civilization and into the land of extinction became the thought of one of the world's leading sanitary organizations.

General William C. Gorgas, who had been the Nemesis of the Yellow Jack at Havana and Panama, was induced to head a board whose mission was to run down that disease to its lair and to stamp it out forever. It was while General Gorgas was en route to Africa, to extirpate the



Photograph by Alexander Stewart

A DENTIST AT WORK IN SHANTUNG PROVINCE, CHINA

No contribution that Western civilization can make to China can surpass that which it is making in establishing a medical school where health leaders can be trained.

sources of infection there, that he died in London, at a time when he might almost have realized his life's dream of "writing the last chapter of the history of yellow fever."

After Major Walter Reed and his fellow-workers in Cuba had demonstrated that yellow fever is a mosquito-borne disease, General Wood and Colonel Gorgas, by following the principles laid down by Reed, banished it from Cuba; Colonel Gorgas drove it out of Panama; Doctor Oswaldo Cruz eliminated it from Rio de Janeiro, and Doctor Liceaga exterminated it in Vera Cruz.

But there still remained a few places that served as seed-beds of the disease, against which the world had to quarantine constantly. One of these was Guayaquil, Ecuador, and there were others in Yucatan, Guatemala, and elsewhere.

Each time a person left one of these communities there was a "fifty-fifty" chance that he carried the possibilities of a big epidemic in his blood.

GUAYAQUIL THROWS OFF ITS CHAINS

Yet there was no way for the outside world to step in and throttle the disease in its endemic haunts unless invited by the governments in whose territories they existed.

Finally Guayaquil, awake to the new spirit of international coöperation for

TESTIMONIALS OF NATIVE PHYSICIANS IN CHENGTU, CHINA

making the world safe from the domination of the Huns of contagion, invited the foremost sanitarians of North America to coöperate with the municipality in a final drive for the extermination of the malady.

The invitation was accepted, and American, Latin, and Nipponese fought shoulder to shoulder in a stirring battle for the last stronghold of Yellow Jack, with the result that in less than a year's time the last case of yellow fever was cured; and in less than two years all danger of its recurrence was past.

For the first time in three-quarters of a century Guayaquil was a port against which the world no longer needed to set up the bars of quarantine.

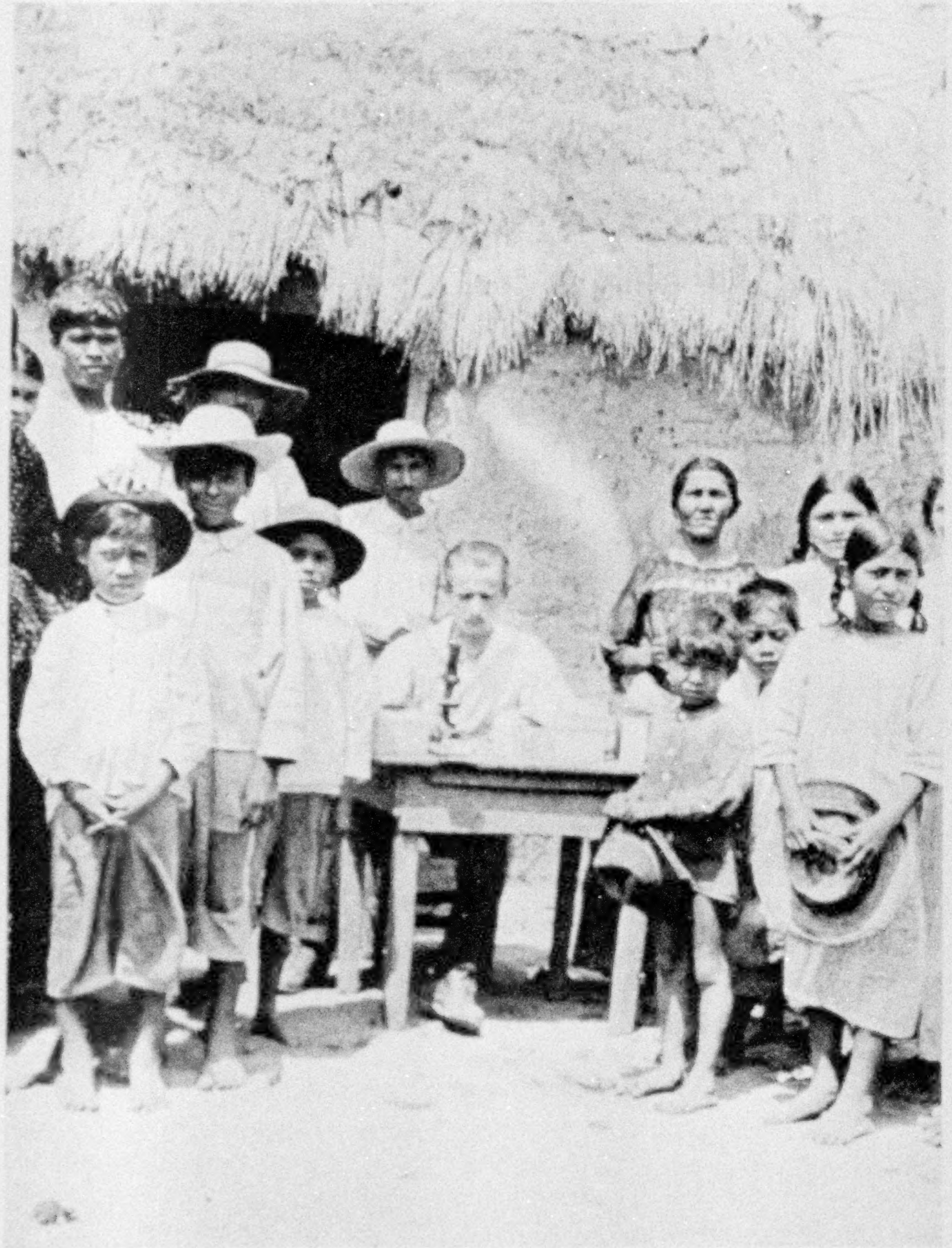
Guayaquil's resolution to rid itself of the Old Man of the Sea of disease, that had sat astride its neck for the better part of a century, had another and a far-reaching result. The city's spirited coöperation made it possible to stage a thorough bacteriological campaign for the definite identification of the invisible foe that causes yellow fever, and, following its identification, to make a serum that would defeat the efforts of the microscopic creature to perpetuate itself.

Hitherto it had succeeded in eluding the most unrelenting quest for it. The bacteriologists knew that it passed from the blood of a yellow-fever patient into the bill of a female *Stegomyia* mosquito, thence into her stomach, where it was incubated, and thence again through her bill into the blood of a well person, where it multiplied and caused yellow fever.

But it was too elusive for microscopic or filter detection, and only through the finest work that had ever been done in a laboratory could science hope to find it.

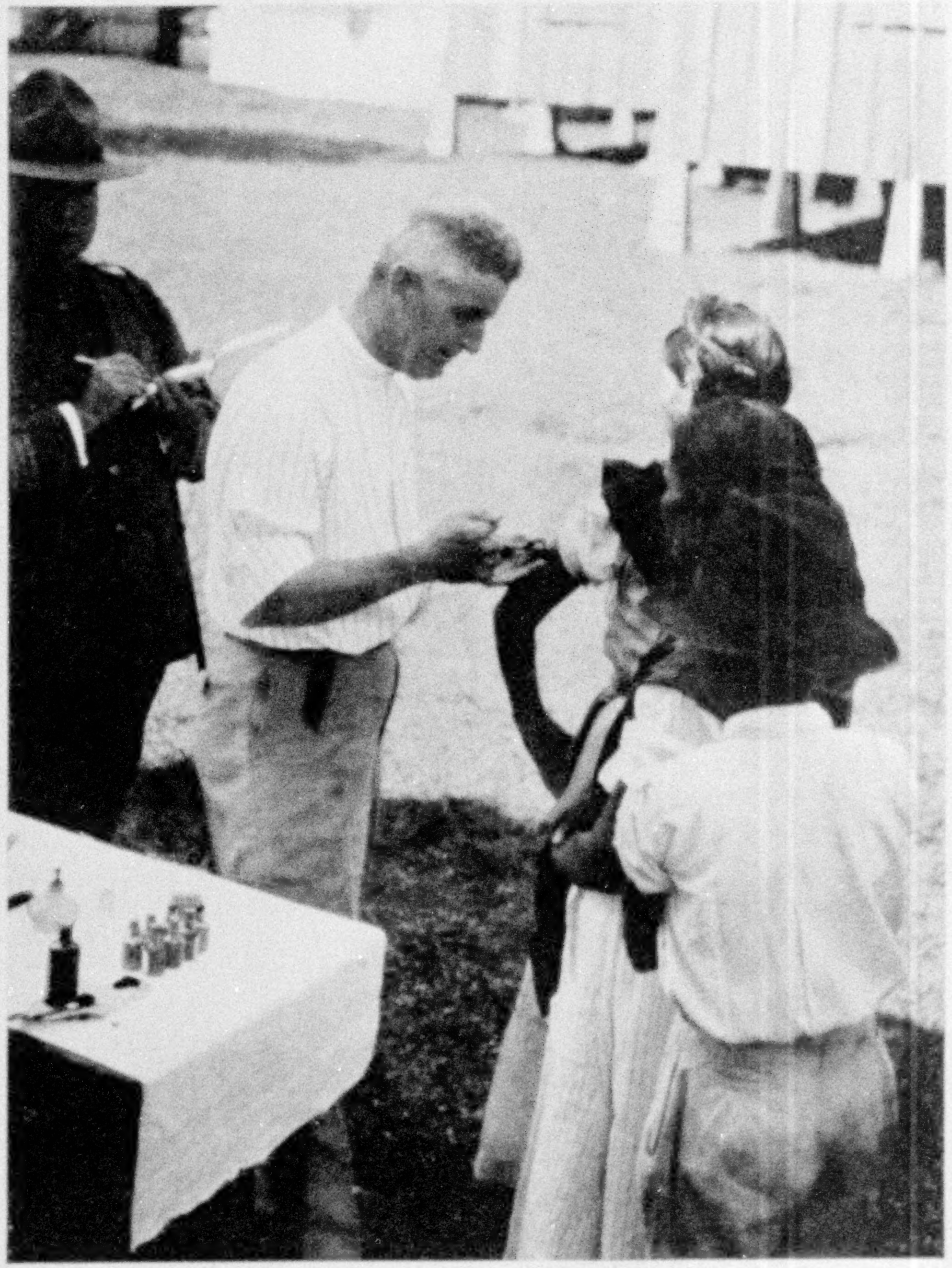
The man selected for the task of discovering it was that Sherlock Holmes of Bacteriadom, Dr. Hideyo Noguchi, the eminent Japanese scientist, now a member of the staff of the Rockefeller Institute for Medical Research. He went to Guayaquil to coöperate with the local bacteriologists, and soon they were hot on the trail of the elusive little sniper.

Using a system of "dark-field illumination," whereby none of the direct rays of



A FIELD STATION IN PANAMA

The microscopist is here bringing ocular evidence to the populace of rural Panama that the hookworm is a real "beast," and demonstrating the process of releasing one's self from it.



VACCINATING AGAINST YELLOW FEVER

Once Dr. Noguchi isolated the yellow-fever germ, it was easy to make a serum against it. The anti-yellow-fever vaccine is almost as effective as the anti-typhoid serum.

light sent from the mirror to illuminate the object can reach the eye, but only the reflected rays that come from the illuminated specimen, he was able to peer very deep into the ghostly realms of the infinitesimal.

A LIVING GHOST IN GERMDOM

And there, in the droplets of blood from yellow-fever patients, he was able to detect a slim, shadowy, ghost-like, filamental, spiral wiggler, almost as eerie as a translucent phantom, twisting and rotating its corkscrew-like way through the blood.

He then tried to breed this "ghost" of germdom, for if he could do that he could be sure that his eyes had not played him false and caused him to imagine what was not. Having previously studied and cultivated its cousin, the germ of infectious jaundice, he was the more readily successful in providing it with an environment which, if not to its taste, was at least according to its necessities.

He found that he could grow colonies at will in culture tubes filled with the blood of human beings or of guinea pigs. He could start one colony from another, and then another from that, almost indefinitely, thus growing successive generations as definitely as we might grow successive crops of potatoes.

Not only so, but he found that from these cultures, as well as by the direct inoculation of the blood of a yellow-fever patient, he could produce yellow fever in guinea pigs, monkeys, and puppies. Even by an examination of the tissues of the animals taking the disease and a comparison of these tissues with those of yellow-fever victims he was able to show the identity of symptoms.

It therefore became so plain that no one could help seeing that the ghost of the "dark field" was in very truth a microscopic monster which, under normal conditions, does to death three out of every five people it attacks. Dr. Noguchi named it *Leptospira icteroides*.

SUCCESSFUL VACCINE AND SERUM EVOLVED

In his work Dr. Noguchi found that artificially cultivated yellow-fever germs, like those of many other diseases, lose a great deal of their virus-producing qualities, although they are still virile enough to hold their own in the blood against an invasion of more toxic newcomers.

With this fact in hand, he developed a serum for the treatment of the disease. Administered within the first four days of the patient's illness, it has, wherever tried, reduced the percentage of fatalities to a surprising degree.

Indeed, while three out of every five yellow-fever patients die where the serum treatment is not used, only one out of ten cases terminates fatally where it is used, the mortality rate being thus cut to one-sixth its former proportions.

But Noguchi did not stop with developing a serum. He also undertook to make a vaccine that would render those who used it immune from attack. Borrowing a page from the experience of those who made typhoid vaccine, he introduced killed cultures of *Leptospira icteroides* into the body. More than 8,000 people have been vaccinated, and, barring a few who took the disease before the vaccination had time to become effective, there has not been a single case among them, although there have been 700 cases in the same areas among the non-vaccinated.

Conservative beyond a layman's comprehension, Dr. Noguchi refused to claim that he had discovered the yellow-fever germ until he had opportunity to make further investigations and to check up his Guayaquil experiments in other fields. Since then he has gone to Yucatan and elsewhere, and all of the results he obtained at Guayaquil have been confirmed.

A VICTIM OF OVERSPECIALIZATION

It thus comes about that there are four ways by which yellow fever may be combatted—by eliminating Mrs. *Stegomyia fasciata*, the deadly lady of the mosquito tribe who carries it from person to person; by keeping persons with the disease out of reach of any chance survivors of the mosquito war; by vaccinating the non-immunes; and by administering serum to those who have gotten the disease in spite of all precautions.

So successful has been the combination of these methods that it is now believed *Leptospira icteroides* has come almost to the end of its rope. The hour of

Photograph by Charles Martin

A MOTHER WITH A SICK BABY CONSULTING A "MEDICINE MAN": PHILIPPINE ISLANDS

"There are many people on the earth who still believe that the snake is the only potent healer; more who still believe in the 'evil eye'; those who try to get rid of tuberculosis by swallowing a live frog; those who eat fox lungs to improve their 'wind'" (see text, page 330).

its extinction is thought about ready to strike, and, like the dinosaur, it will die out chiefly because it is a victim of overspecialization.

It is believed once to have been an inhabitant of the blood of various rodents; then some mosquito carried it from rodent to man, and it found its new environment so much to its taste that it refused to thrive in its old habitations any longer. It came to be wholly dependent on man for its habitat and on the mosquito for its transportation. Elimination of its vehicle of transportation means inevitably its extinction.

In the course of their work for the eradication of yellow fever, the sanitarians find that the employment of surface-swimming minnows is a better way of combatting the mosquito than the use of an oil film on the surface of the water, because less expensive and more constant.

Hardy, multiplying rapidly, and always seemingly as hungry as wolves, these minnows are able to control the mosquito situation in 85 per cent of the waters in which they are introduced.

In 1919 a big epidemic of yellow fever, with more than 3,000 cases, broke out in northern Peru. The lessons learned at Guayaquil were applied to check it. The little top-minnow was put to work and proved an amazingly valuable ally in banishing the disease from the region.

WHEN-THE-BUZZARDS-ENTERED-THE-HOUSE DISEASE

It has been advanced as a theory by students of Central American archeology that yellow fever was responsible for the fall of the highly developed Maya civilization, and that the majestic ruins at Mitla, Palenque, Chichen Itza, Petén, Quirigua, and elsewhere, from Yucatan to Honduras, are eloquent testimonials of the uncontrolled power of yellow fever. In their records, for which dates appear to be fixed definitely as far back as the beginning of the Christian Era, the peoples of those times have left evidences of the horrors of yellow-fever epidemics. In their inscriptions they show the disease to have been one in which the patient vomits blood. They called the malady *oc-nat-chucil*, meaning the "when-the-buzzards-entered-the-house" disease.

When we remember that, even with modern methods of treatment, three out of every five people attacked die, and that in Maya days the treatment consisted of magic instead of medicine, we can very well see how deaths were so numerous and illness so general that the dead could not be buried.

And so it has come to pass that sanitary science is able to hold out to humanity a charter of freedom from three of the greatest scourges that have beset mankind. Nations are beginning to follow the splendid standard raised by Great Britain a half century ago which bears the inscription, "The people's health is the supreme law."

In the Philippines, in Porto Rico, the gospel of good health is America's foremost contribution to the inhabitants' welfare. The United States Government has untiringly sought to cut down the death rate in our dependencies. Throughout the British Empire, in Africa, in India, in tropic seas, British sanitarians have carried the glad tidings of better health. In Indo-China, in Madagascar, French sanitarians, through the Institute of Colonial Medicine, have labored with stirring success to prevent sickness and circumvent death. In Formosa, Japan has shown how high death rates may be cut down and well-being promoted, even among illiterates.

Gradually all the microscopic monsters that have challenged man's dominion on the earth are being circumvented. Before the days of Jenner, smallpox was the popular disease, as unescapable as measles and whooping cough now. Men are still living who remember when typhus was one of the great scourges of our cities, and who recall the time when a full fifth of the doctors of Ireland died from the disease.

But after all that Western civilization has done for the release of humanity from the terrible scourges that in the past have decimated mankind, there still remains that wonderful one-fifth of the human race we know as China, all but helpless before the onslaught of contagion's spread.

Commerce, as has been well said, carries dangerous infections as well as goods and ideas; but China has struggled to combat them with agencies as antiquated as the oxcart and the pony express. The consequence has been that this country has the world's highest death rate, estimated at as much as 40 per thousand, or thirteen million a year.

To reduce this terrible toll by bringing the gospel of modern medicine and sanitation to the vast hordes of people of Chinese blood, American altruism has thrown a king's ransom into the work of medical education in that country.

Here and there influences were at work for the bringing of the blessings of modern medical knowledge to the great Asiatic republic. Missionary societies had labored valiantly against overwhelming odds. Christian missionary societies had supported 317 hospitals, besides many dispensaries.

In addition, there were some medical schools maintained by the central and provincial governments, with teaching staffs recruited from students of some of the institutions of Japan. A few rather weak schools were maintained by the missionary activities of America. But all together they constituted only a drop in the bucket compared to China's needs.

"THE GREEN CITY OF PEKING"

To-day, thanks to American friendship for and faith in China, the "Green City of Peking" is an accomplished fact. A great medical university, with its faculty recruited from the best institutions of the West, has thrown open its doors, its major aim being to develop in China an adequate corps of trained Chinese physicians and nurses and to establish thoroughly equipped hospitals.

That university is the Peking Union Medical College. The construction of fifteen buildings was a sight that interested "young China" very much. The making of uniform sash, door, and window-

A HINDU TEMPLE IN THE FIJI ISLANDS AND ITS PRIEST, WHO HAS BECOME AN APOSTLE OF DISEASE PREVENTION

frames, with modern wood-working machinery, naturally amazed a people accustomed to handwork whose common translation of "identical" is "not very different."

The institution consists of anatomical, physiological, chemical, and pathological laboratories, a 250-bed hospital, etc. The trustees are chosen by the China Medical Board in coöperation with six missionary societies.

It is expected that the nurses trained here will be women, even for the men's wards. This is an innovation, as China has never had women nurses for men patients. The change will be made cautiously and gradually. Women will be encouraged to enter the school for the study of medicine.

In addition to the Peking Union Medical College, funds are annually appropriated for the improvement of hospitals throughout the country, with a view to providing suitable facilities for the doctors turned out by the medical school, and furnishing a demonstration to the people at large of the benefits of modern medical science.

With that spirit of progress which seems destined to mold China into one of the future's chief nations, the government and the people have heartily welcomed this new evidence of American friendship and faith. Cordial relations are maintained with the Chinese leaders working in the same fields of medicine and hygiene.

The yearly deaths in China now number around 13,000,000. If the death rate that obtains in the United States came to apply in that country, the annual death roll would reach only 4,550,000.

Think of a possible saving of more than eight million lives a year! Think of rescuing annually as many people from untimely graves as live in Argentina or Canada, more than live in Belgium, Australia, or Sweden! Was there ever such a challenge to altruism and science as that?

Although the plan of campaign that ultimately will eliminate the world's major contagions has been well mapped out, the officers' training camps, in which the men who are to captain the forces of health in the great drive, have been far from adequate. From all parts of the world are coming appeals for trained sanitarians.

To meet this condition Johns Hopkins University has established a School of Public Health and Hygiene. Harvard has enlarged its work along similar lines. Columbia has expanded its medical activities, and all the health agencies of the United States are coöperating in the creation of a proper course of instruction in public health leadership.

In Canada six medical schools have enlarged their work; in Belgium the Queen Elizabeth Foundation for Medical Research has been established; in Brazil the Medical School at São Paulo has added hygiene and public health to its curriculum.

In England five million dollars has been pledged to the University of London and the University College Hospital for the creation of a modern health center in London.

Thus it is soon to come about that adequately trained public health leaders will be available to officer the health armies that will never relent until the autocracy of contagion is laid low.

And what a field for work they have! Among the most backward half of the earth's population the annual death rate ranges between 30 and 40 per thousand. Among the most progressive fifth it ranges from 15 down to 10 per thousand. The average is around twenty-six.

Whether there shall be upward of forty million people dying every year, as at present, or whether this tremendous death toll shall be reduced to less than twenty million, which is what experience in progressive states shows to be an attainable goal, depends mainly on the work of sanitarians who would end the sway of contagion throughout the earth.

OPENING THE TROPICS TO THE CAUCASIAN

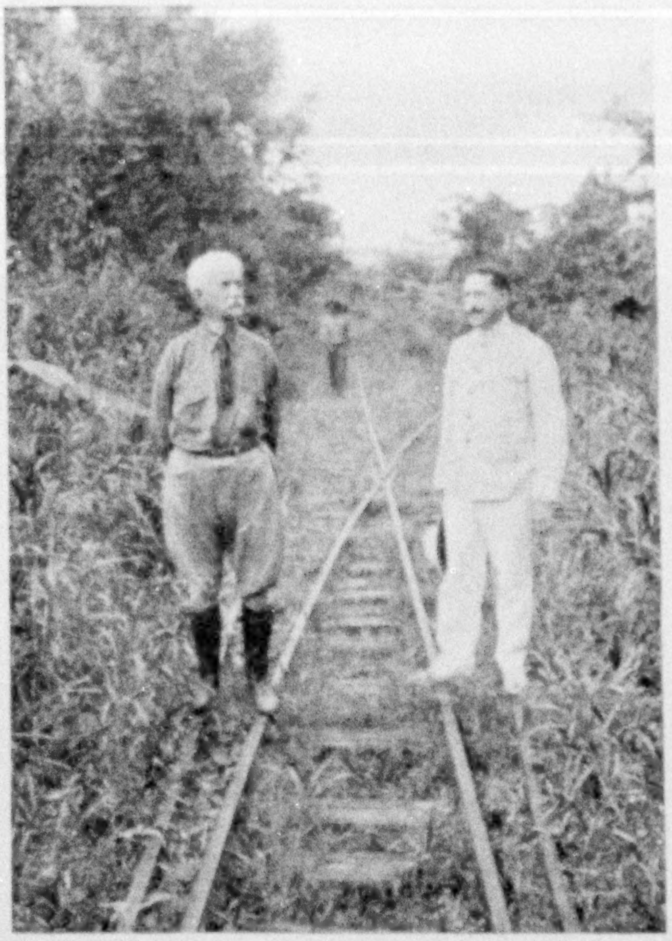
There is another aspect to the international health situation that challenges attention.

The most productive half of the earth's surface lies within parallels of latitude where contagion is most rampant. As humanity expands it must look more and more to the tropics for its food.

How fast mankind is expanding few people realize. Mulhall and other statisticians tell us that the population of the earth was 650,000,000 when Napoleon had himself proclaimed Emperor, as compared with 1,625,000,000 when the World War began. In other words, the population of the earth expanded two and a half times as much from 1804 to 1914 as it had from the days of Adam to those of Napoleon.

With a heavy rainfall to take the place of irrigation, with rich soils, with abundant and intense sunshine, the tropics have food-producing potentialities that beggar description.

And sanitation has proven its power to break the domination of the white man's principal foes there—disease germs.



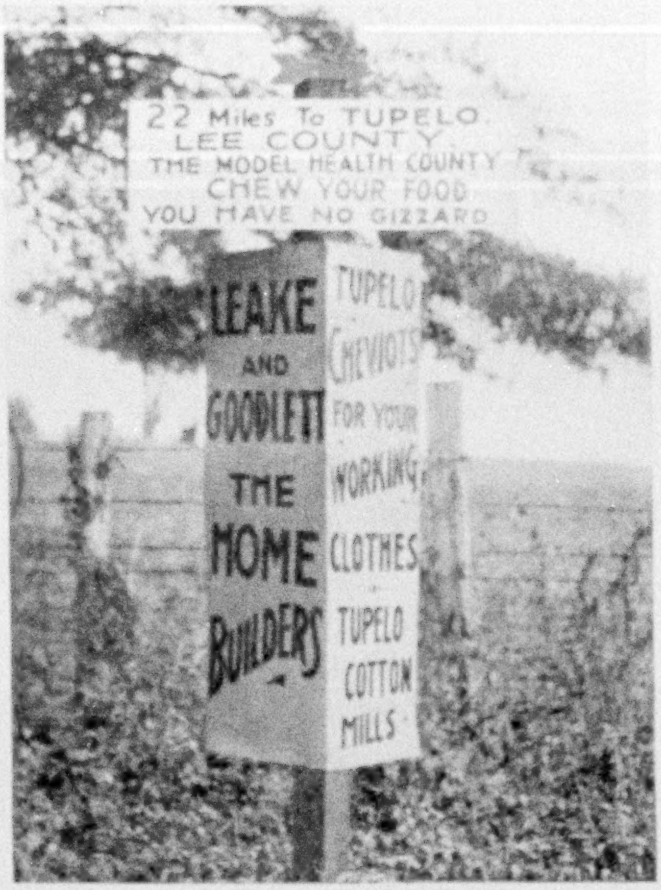
GENERAL GORGAS (AT THE LEFT) IN A GUATEMALAN JUNGLE

The achievements of sanitary science in promoting the well-being of humanity, where it has been applied, tax belief. The natural opportunities for contagion to travel to the ends of the earth on the wings of humanity's commerce are legion. A thousand ships sail the seven seas now, where one crossed them four hundred years ago. Ten thousand persons travel by train and automobile now, where one journeyed by caravan in the days before sanitation's rise.

But even in those days, when the human race didn't go beyond its own neighborhood as much in a quarter of a century as present-day civilization does in one week, and when the world had less than one-fifth as many people as it now has—even then all nations were frequently prostrated by epidemics—terrible, calamitous scourges that filled whole continents with weeping and lamentation.

Resistance was useless, for no one knew how to resist. All that could be done was for the sick to bury the dead, and wait disconsolately for the day when the fires of infection would burn themselves out because there was no more fuel.

In a single epidemic of black plague, China alone lost enough of its population



"TWENTY-TWO MILES TO TUPELO"

Congress established a fish hatchery at Tupelo after its Representative in Congress had proved that place to be the center of the universe, on the ground that there the horizon was equidistant everywhere. To-day Lee County, Mississippi, of which Tupelo is the county seat, proclaims that man has no gizzard.

to fill five rows of graves reaching around the earth. Spreading to Europe, this same epidemic found enough victims to replace every casualty in the World War.

But this was no isolated calamity. Now cholera, now smallpox, again the plague, now influenza, starting mayhap in the Orient, would follow the caravans to India, then journey with the religious pilgrims to Mecca, and then scatter to the four corners of Europe, overwhelming the Continent as irresistibly as a mighty flood. Millions of graves, millions of pauperized survivors, millions of desolate homes followed every invasion.

If such results grew out of the wanderings of a few traders and the journeyings of a few religious pilgrims, what would happen to-day were it not that sanitary science has erected barriers everywhere for our protection?

To see the death rate of progressive communities reduced to 10 per thousand, in the face of such a vast increase in intercommunity and international intercourse; to see the average life span in America lengthening from 31 to 40 years within four decades—mainly through the work of the sanitarian—is, to those who reflect, a wonderful earnest of the victories of sanitation that are destined to be won in the years that lie immediately ahead.

WHERE IGNORANCE REIGNED

There are many people on the earth who still believe that the snake is the only potent healer; more who still believe in the "evil eye"; those who try to get rid of tuberculosis by swallowing a live frog; those who eat fox lungs to improve their "wind"; those who essay to cure epilepsy by having the patient wear the unwashed shirt of one who died of that malady; some who recommend the curing of goiter by drawing a live snake nine times across the thyroid glands, and whooping cough by feeding the patient boiled mouse meat. Others believe that by rubbing their jaws where hogs rub theirs they will escape the mumps.

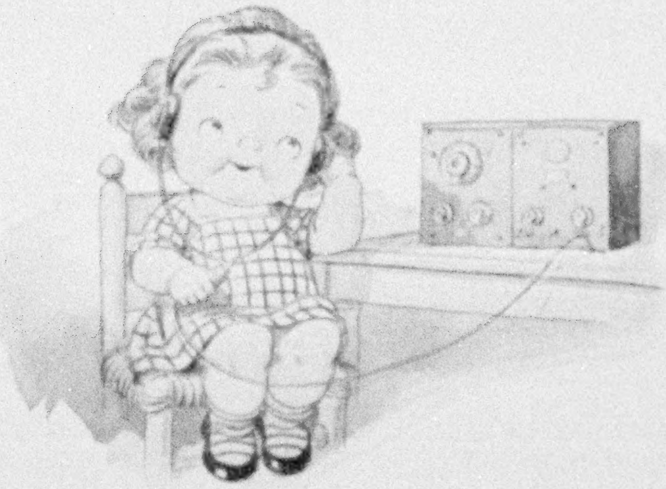
It is only a few centuries since people contended that the brain was a sponge to keep the heart cool; since Harvey was denounced for saying the heart was the engine that drives the blood through the body. In the days of our great-grandfathers, people said smallpox vaccination made girls cow-faced, and caused boys to bellow like bulls. Even within the memory of living men, the use of anesthetics was denounced as the work of the Devil, by otherwise sensible people.

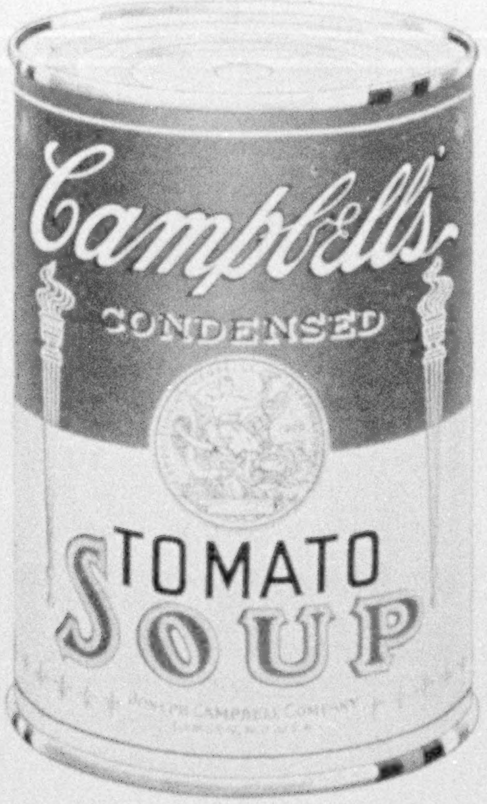
But to-day, with the number of deaths cut in half wherever the sanitarian holds sway, with the average life lengthened eight or nine years where his advice is lived out, preventive medicine has been vindicated a thousand fold, and the outlook for the future is such as must hearten every thoughtful person and arouse the hope that the grip of the tyrant of contagion on the peoples of the earth is destined to be broken, and that as the generations come and go the science of eugenics and the science of preventive medicine will work hand in hand for the development and maintenance of a better race, inspired by nobler ideals and moving on to a richer destiny.

XUM

GREAT FOR BREAKFAST—INVIGORATING SOUP

C E D is the station for me—
C-ampbell's E-very D-ay!
Its radiation brings jubilation—
Just hear what your neighbors say!





Listen in!

Hear what your friends are saying about Campbell's Tomato Soup. Ask them how they like it. You'll soon learn that it's the most popular of all soups—the soup which has "broadcasted" the name and the fame of Campbell's to every corner of the land. Just one delicious spoonful and you'll know why.

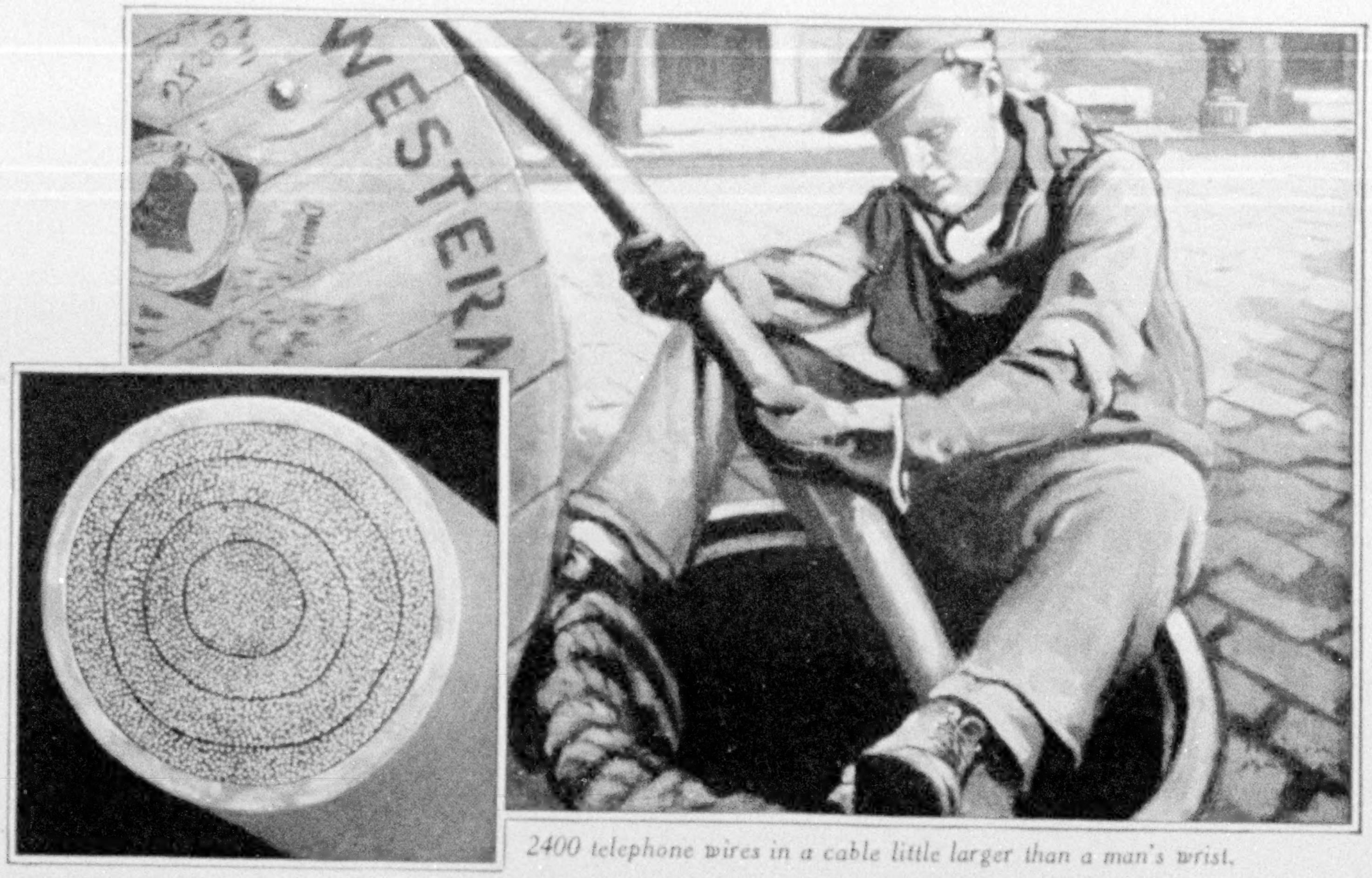
Campbell's Tomato Soup

has all the goodness from the most luscious, tempting tomatoes—just the pure tonic juices and fruity parts strained to a rich, smooth puree, blended with golden table butter and delicately spiced. Have Campbell's Tomato Soup for luncheon or dinner today and see what a real joy it is to your appetite!

21 kinds **12 cents a can**

Campbell's SOUPS

LOOK FOR THE RED AND WHITE LABEL



2400 telephone wires in a cable little larger than a man's wrist.

Science keeps down costs

When the Bell System installed its first successful telephone cable, fifty wires was the largest number that could be operated in a single cable without "cross-talk" and other interference. Today it would require 48 cables of the original type to accommodate the number of wires often operated in one cable.

Without this improvement in cable, the construction of new underground and aerial lines would have cost the Bell System upwards of a hundred million dollars more than has actually been spent. In addition, the cost of maintenance would have been greater by eighteen million dollars a year. These economies in the Bell System mean a saving in telephone rates to each individual subscriber.

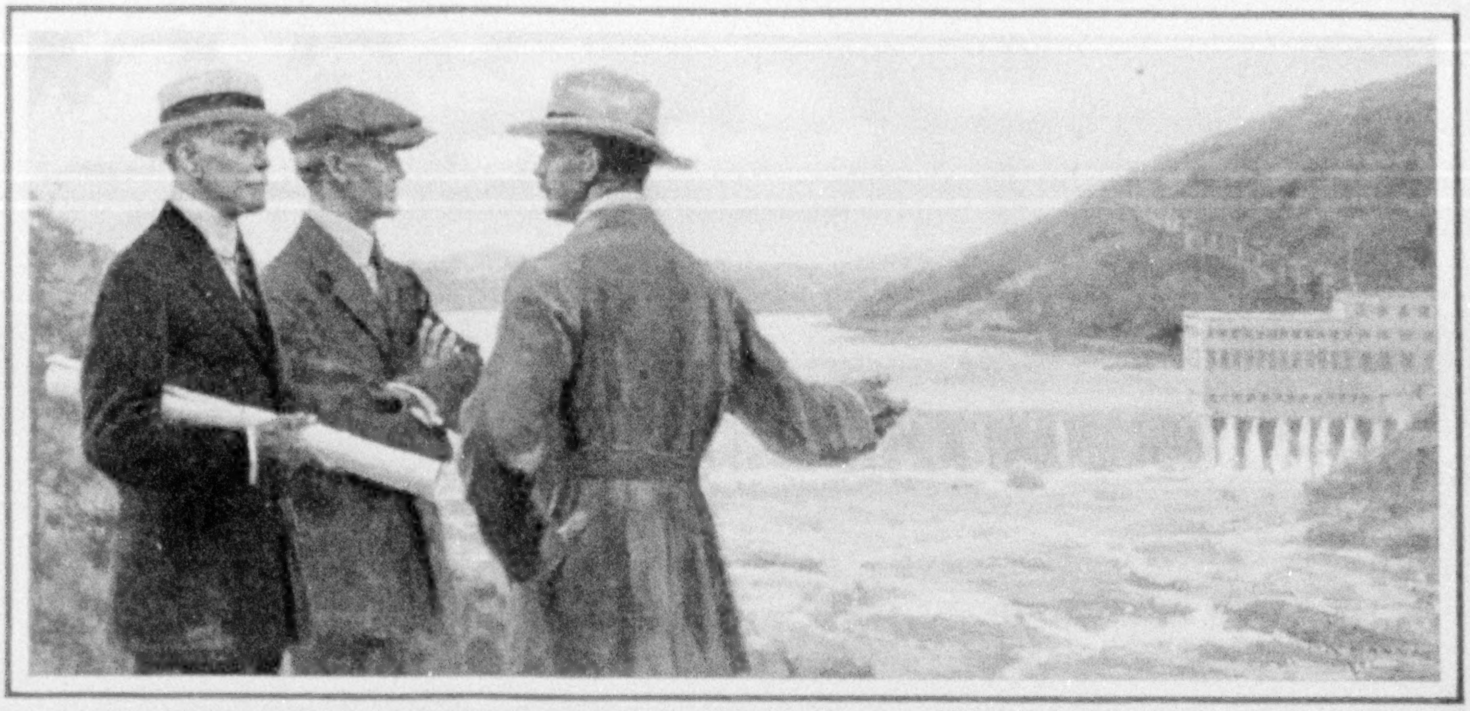
In all branches of telephone practice science has similarly contributed to economy. Even in such a comparatively small item as switchboard cords, improvements have reduced the cost of renewal by four million dollars a year.

Every new telephone added to the Bell System increases the usefulness of *all* telephones, but this multiplication tends likewise to increase the complications and the expense of service. The scientists of the Bell System, to offset this tendency, are constantly called upon to develop new devices which simplify complications and keep down costs.

By virtue of a united system the benefits of these improvements are shared by all subscribers—and the nation is provided with the best and cheapest telephone service in the world.

"BELL SYSTEM"
AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

One Policy, One System, Universal Service, and all directed toward Better Service



The Hydro-Electric Engineer and the Waterfall. The rushing stream has potential power to turn the wheels of industry and bring electric light to a whole community—but it requires the studies and services of an experienced engineer to harness that power and put it to work.

Invest—with the help of experienced counsellors

The investor puts the earning power of his money to work when he buys securities.

How should he invest?

The multitudes of offerings in every field are fairly bewildering. The hydro-electric companies alone should have a vast amount of new capital to keep pace with public requirements. The need for dependable investment information and experienced counsel was never greater.

The National City Company, through its offices in 50 leading cities, offers you such information and counsel.

Every bond listed on our current Purchase Sheet has received thoughtful study and is recommended as desirable in its class.

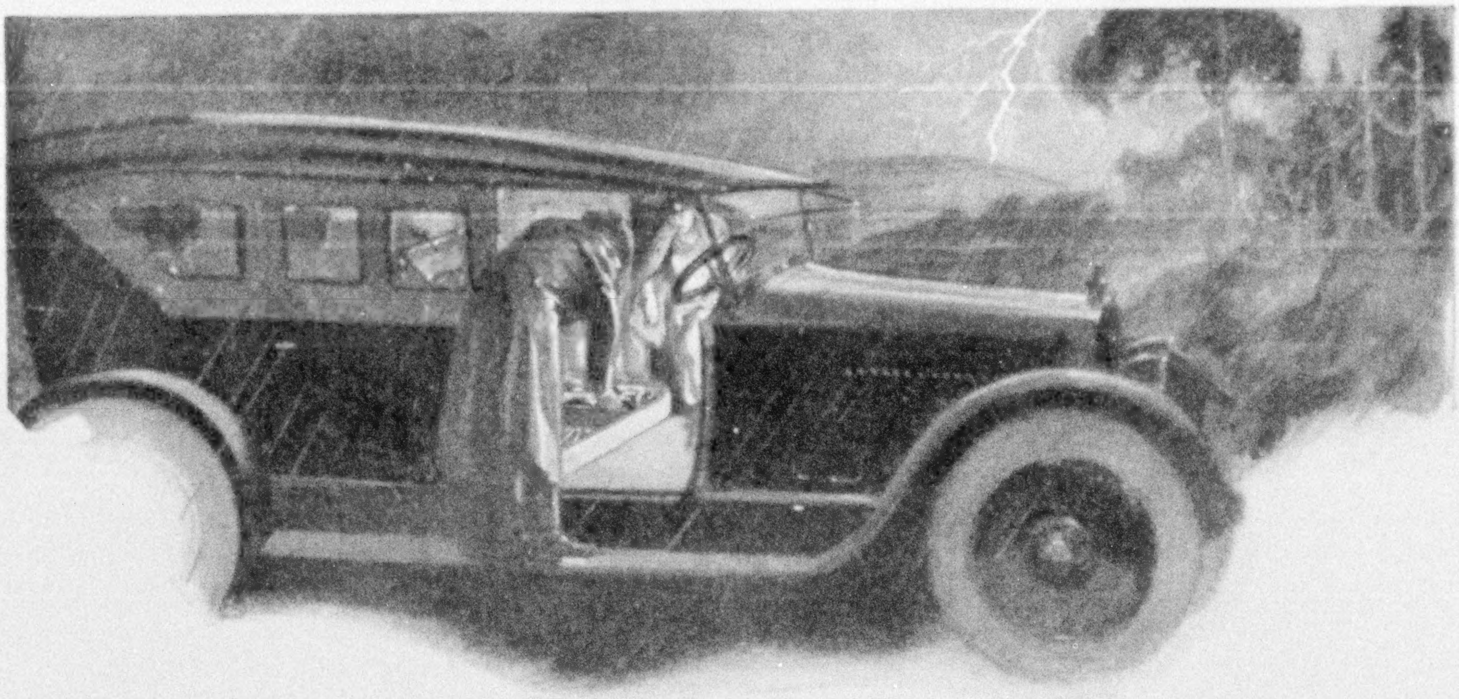
Consult this list—we will mail a copy on request.

The National City Company

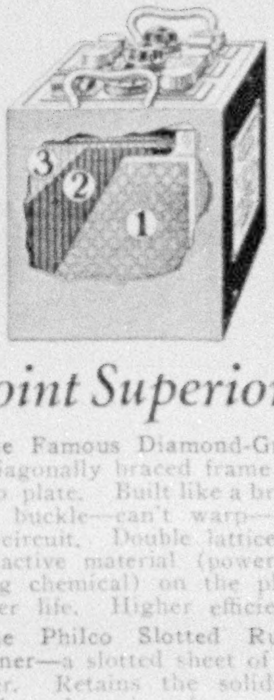
National City Bank Building, New York

Offices in more than 50 leading cities throughout the World

BONDS
SHORT TERM NOTES
ACCEPTANCES



That ghost of the night trail ~ battery trouble



3-Point Superiority

1. **The Famous Diamond-Grid**—the diagonally braced frame of a Philco plate. Built like a bridge. Can't buckle—can't warp—can't short-circuit. Double latticed to lock active material (power-producing chemical) on the plates. Longer life. Higher efficiency.
2. **The Philco Slotted Rubber Retainer**—a slotted sheet of hard rubber. Retains the solids on the plates but gives free passage to the current and electrolyte. Prevents plate disintegration. Prolongs battery life 41 per cent.
3. **The Quarter-Sawed Hard-Wood Separator**—made only from giant trees 1,000 years old; quarter-sawed to produce alternating hard and soft grains. Hard grains for perfect insulation of plates. Soft grains for perfect circulation of acid and current—quick delivery of power. Another big reason why Philco is *the* battery for your car.

LOOK FOR THIS SIGN

of better battery service. Over 5,000 stations—all over the United States

PHILADELPHIA DIAMOND GRID BATTERY

With the PHILCO Slotted Retainer

A lonely road—stormy night—battery "dead"—and miles from a service station! It's the *emergencies* that make you realize what a long-life, power-packed Philco Battery means in your car.

The Philco Battery, with its tough, rugged, shock-proof construction, gives years—not just months—of dependable, trouble-free service. The Philco Battery not only stands *work*—it stands *punishment*.

Philco's diamond-grid plates are buttressed—in every direction—against shocks that buckle, warp, twist and short-circuit the plates of ordinary batteries. Philco's slotted retainers and quarter-sawed separators *keep these plates alive*.

Philco construction stands up in emergencies. That's why thousands of car owners today—*at the first sign of battery trouble*—are replacing the ordinary batteries that came with their cars with reliable long-lasting Philcos.

The Philco Slotted-Retainer Battery, with the famous diamond-grid plates, is guaranteed for two years—*but it is built to last years longer*. And it now costs you no more than just an ordinary battery.

Consult your nearest Philco Battery Man at once. He is a specialist in long life for batteries. No matter what make of battery is in your car, prompt attention may save you months of battery life. And not until your battery is definitely worn out—when by mutual agreement no further repairing would be justified—will he advise a new battery for your car.

Philadelphia Storage Battery Co., Philadelphia

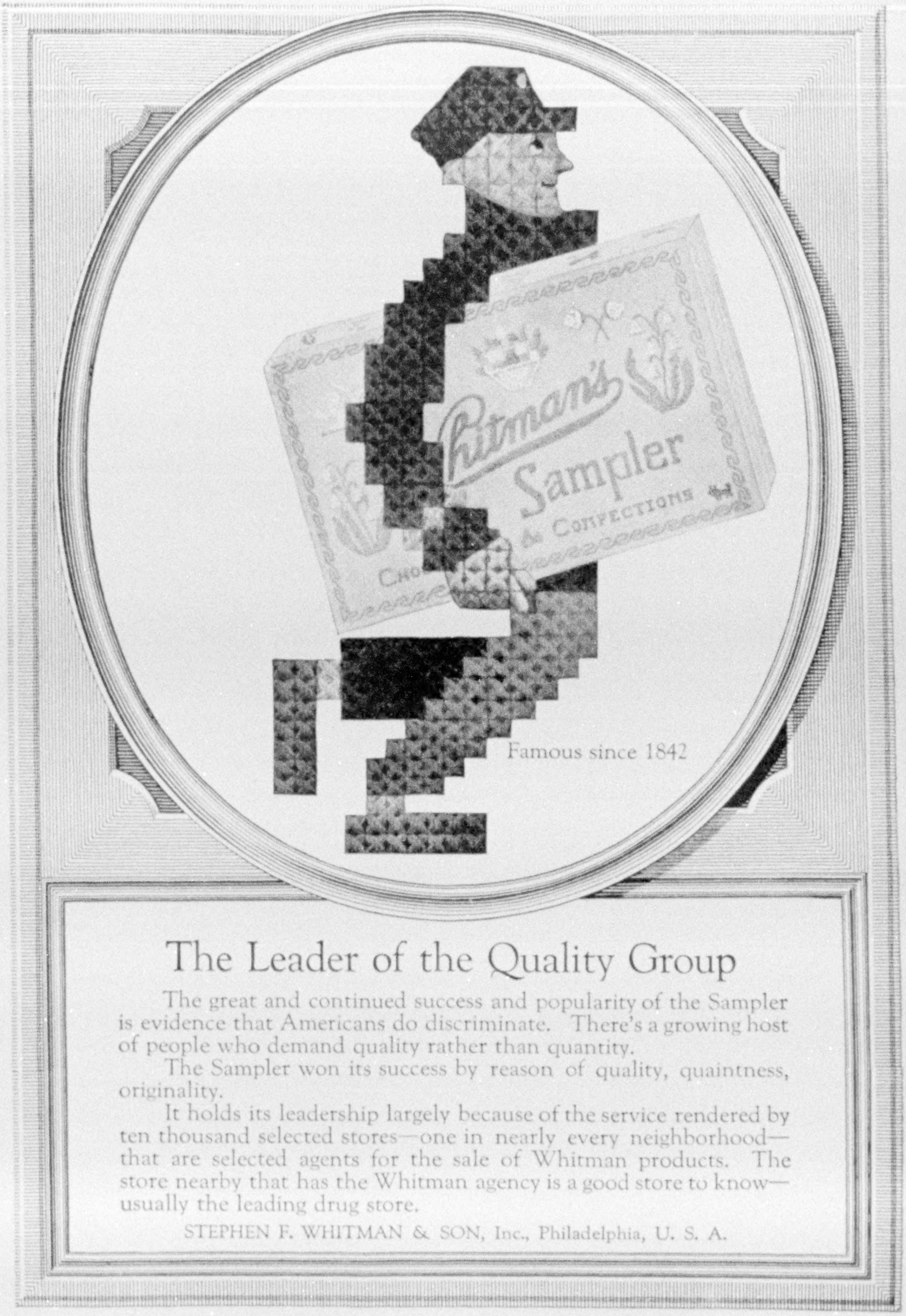
Makers of the famous Philco Slotted-Retainer Batteries—the standard for electric passenger cars and trucks, mine locomotives and other high-power, heavy-duty battery purposes.

PHILCO

SLOTTED-RETAINER

BATTERIES

with the famous "Philadelphia" Diamond-Grid Plates



Famous since 1842

The Leader of the Quality Group

The great and continued success and popularity of the Sampler is evidence that Americans do discriminate. There's a growing host of people who demand quality rather than quantity.

The Sampler won its success by reason of quality, quaintness, originality.

It holds its leadership largely because of the service rendered by ten thousand selected stores—one in nearly every neighborhood—that are selected agents for the sale of Whitman products. The store nearby that has the Whitman agency is a good store to know—usually the leading drug store.

STEPHEN F. WHITMAN & SON, Inc., Philadelphia, U. S. A.

Daniel Webster's Hat

ONE of Daniel Webster's famous retorts was to a young man when their hats got mixed.

"Why, Mr. Webster," said he, "our heads are just the same size."

"On the *outside*, perhaps," replied Webster.

If there had been 10,000,000 automobiles in Webster's day this might have hit off the feeling about tires as well.

* * *

To understand the tire situation today, go back to 1918, 1919 and 1920, when tire makers were jumping to catch up with the demand. In 1921 they more than caught up.

And in 1922, every car-owner knows where he can get plenty of tires with plenty of big discounts. Plenty of bargains with ingenious sales-arguments.

A vast quantity of merchandise he knows little or nothing about.

* * *

The quantity problem is *history*.

It is all this quantity of tires—and their wide variance in value that is making most car-owners *determined* to get *quality*.

Hundreds of thousands of car-owners rode on Royal Cords last year.

The unobserving man might say that this was reaching the limit of the quality idea.

Yet, in January, February, March, April and May, 1922, the sales of U.S. Royal Cords through dealers more than doubled over the same period of 1921. A new high record for Royal Cords.

Spontaneous buying through dealers.

A picture of the public voluntarily making U. S. Royal Cords the measure of *all* automobile tires.

* * *

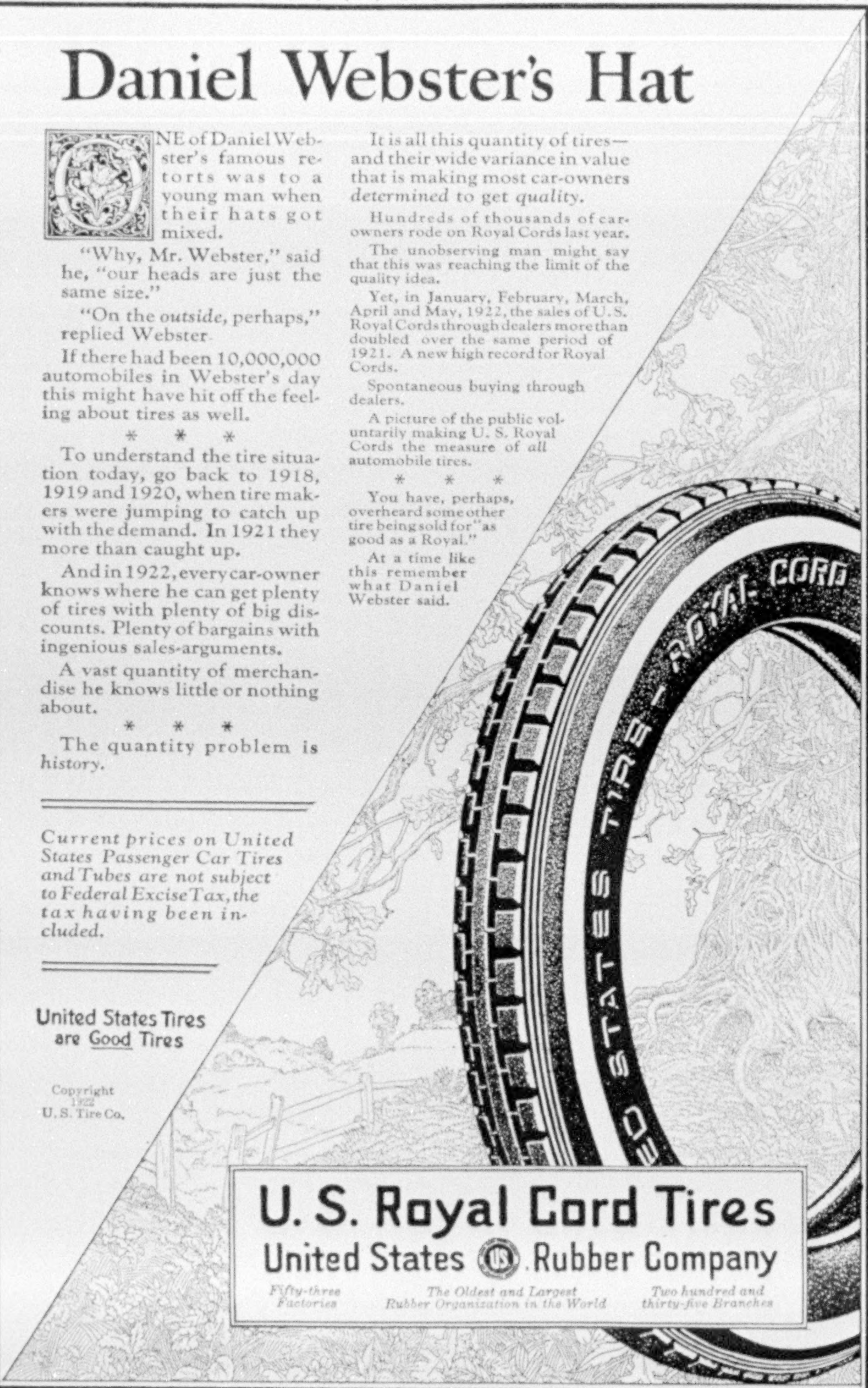
You have, perhaps, overheard some other tire being sold for "as good as a Royal."

At a time like this remember what Daniel Webster said.

Current prices on United States Passenger Car Tires and Tubes are not subject to Federal Excise Tax, the tax having been included.

United States Tires
are Good Tires

Copyright
1922
U. S. Tire Co.


UNITED STATES TIRES — ROYAL CORD

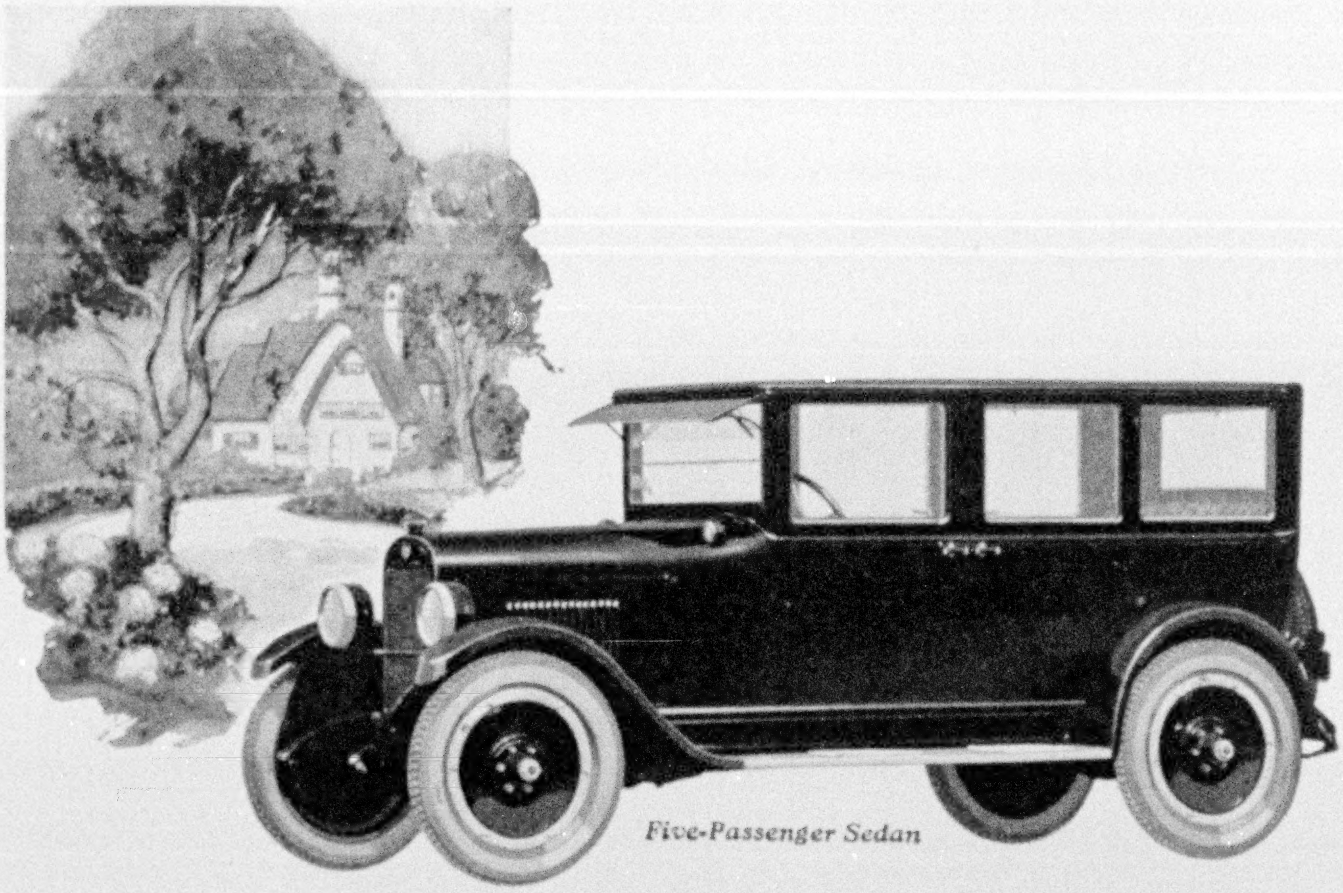
U. S. Royal Cord Tires

United States Rubber Company

Fifty-three Factories

The Oldest and Largest Rubber Organization in the World

Two hundred and thirty-five Branches



Five-Passenger Sedan

The admiration for the extraordinary beauty and grace of the good Maxwell has deepened, everywhere, into sincere respect.

Every community now knows—through the medium of the tens of thousands of owners of the new series—that the good Maxwell is all that its great beauty promises.

Not only in the thorough quality of its bodywork and its fittings; but in the endurance, economy and comfort, the robust reliability and fine performance, which are unusual in the average car of its price.

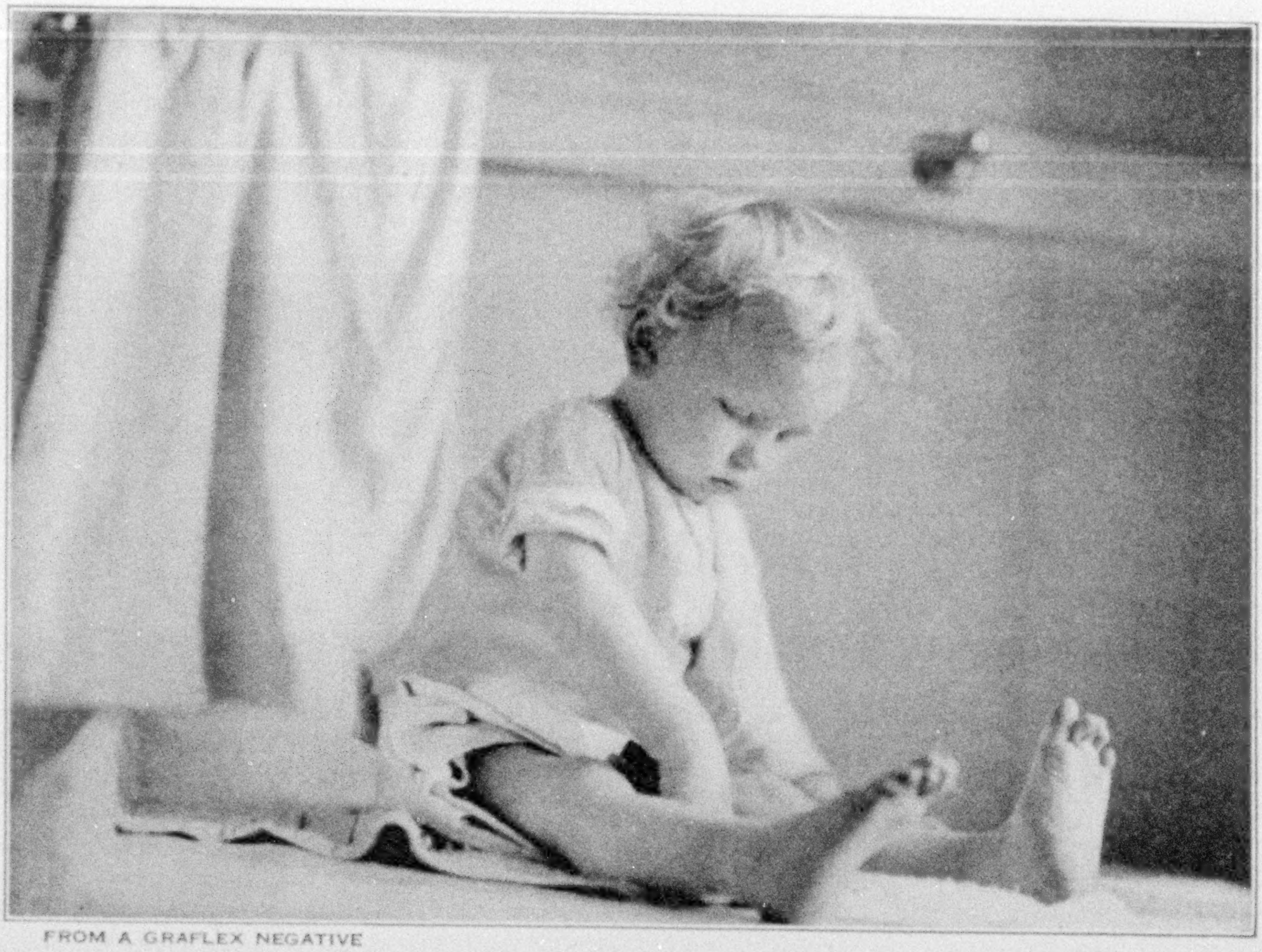
MAXWELL

Cord tires, non-skid front and rear; disc steel wheels, demountable at rim and at hub; drum type head and parking lamps; windshield cleaner; rear-view mirror; dome and instrument board lights; Alemite lubrication; motor-driven electric horn; unusually long springs; deep, wide, roomy seats; broadcloth upholstery; clutch and brake action, steering and gear shifting, remarkably easy.

MAXWELL MOTOR CORPORATION, DETROIT, MICH.
MAXWELL MOTOR CO., OF CANADA, LTD., WINDSOR, ONT.

The Good
MAXWELL

XUM



FROM A GRAFLEX NEGATIVE

GRAFLEX

Graflex advantages are valuable every time you take a picture, whatever the nature of the subject.

You *know* when the focus is sharp, you *see* what the view includes because a big image of the subject, right side up, is visible in the focusing hood until the very instant of exposure.

Graflex focal plane shutter, with speeds of 1/10 to 1/1,000 of a second, and a superfine lens such as the Kodak Anastigmat *f*.4.5, are a combination that safeguards proper exposure even under difficult light conditions.

"The Graflex Baby Book"—the story of how one family
kept the baby's biography—by mail on request.

Eastman Kodak Company
Folmer & Schwing Department *Rochester, N. Y.*

Teeth You Envy

Are brushed in this new way

Millions of people daily now combat the film on teeth. This method is fast spreading all the world over, largely by dental advice.

You see the results in every circle. Teeth once dingy now glisten as they should. Teeth once concealed now show in smiles.

This is to offer a ten-day test to prove the benefits to you.

That cloudy film

A dingy film accumulates on teeth. When fresh it is viscous—you can feel it. Film clings to teeth, gets between the teeth and stays. It forms the basis of cloudy coats.

Film is what discolors—not the teeth. Tartar is based on film. Film holds food substance which ferments and forms acid. It holds the acid in contact with the teeth to cause decay.

Millions of germs breed in it. They, with tartar, are the chief cause of pyorrhea. Thus most tooth troubles are now traced to film, and very few escape them.

Must be combated

Film has formed a great tooth problem. No ordinary tooth paste can effectively combat it. So dental science has for years sought ways to fight this film.

Two ways have now been found. Able authorities have proved them by many careful tests. A new tooth paste has been perfected, to comply with modern requirements. And these two film combatants are embodied in it.

This tooth paste is Pepsodent, now employed by forty races, largely by dental advice.

Other tooth enemies

Starch is another tooth enemy. It gums the teeth, gets between the teeth, and often ferments and forms acid.

Nature puts a starch digestant in the saliva to digest those starch deposits, but with modern diet it is often too weak.

Pepsodent multiplies that starch digestant with every application. It also multiplies the alkalinity of the saliva. That is Nature's neutralizer for acids which cause decay.

Thus Pepsodent brings effects which modern authorities desire. They are bringing to millions a new dental era. Now we ask you to watch those effects for a few days and learn what they mean to you.

The facts are most important to you. Cut out the coupon now.

Pepsodent
REG. U. S. PAT. OFF.

The New-Day Dentifrice

Endorsed by modern authorities and now advised by leading dentists nearly all the world over. All druggists supply the large tubes.

10-Day Tube Free 947

THE PEPSODENT COMPANY,
Dept. 169, 1104 S. Wabash Ave., Chicago, Ill.
Mail 10-Day Tube of Pepsodent to

....

....

....

Only one tube to a family

FINER

C. Harold Wills has designed and built in the Wills Sainte Claire a motor car that is lighter, swifter, safer, more economical, more comfortable, more durable and finer—a motor car, not more complicated, but greatly simplified. Have you ridden in the Wills Sainte Claire?

C. H. Wills & Company, *Marysville, Michigan*

WILLS SAINTE CLAIRE

Motor Cars

© C. H. W. Co.

---

70 years of scientific lens-making

The Bausch & Lomb
TESSAR LENS

leads all anastigmats

FOR years, Tessar has been acknowledged as the finest among anastigmat lenses. One of the first to be made in America, Tessar has kept pace with optical progress and has consistently been the leader.

Bausch & Lomb's seventy years of scientific lens-making is the reason for the success of this finest anastigmat. In the great optical shops of Bausch & Lomb the glass is melted and moulded, the lenses are ground and polished and so on to the finished product. Entirely American-made, the Bausch & Lomb Tessar Lens stands supreme.

The Tessar is made for your camera. Write for the book, "What Lens Shall I Buy?"

BAUSCH & LOMB OPTICAL COMPANY
602 St. Paul Street, Rochester, N. Y.
New York Washington Chicago San Francisco London

*Leading American makers of **Stereo-Prism Binoculars, Telescopes, Photographic Lenses, Projection Apparatus (Balopticons), Microscopes, Magnifiers, Automobile Lenses and other High-Grade Optical Products.***

To the Mediterranean

ADRIATIC	LAPLAND
(24,541-tons)	(18,565-tons)
Jan. 6 and Feb. 24, 1923	Jan. 18 and Mar. 10, 1923

Winter cruises aboard the splendid White Star liner *Adriatic* and the Red Star steamer *Lapland*—world-famous for their steadiness, de luxe quarters, and cuisine and service—carry passengers of discrimination to the world's most brilliant playgrounds in Egypt and Southern Europe.

Itinerary: Madeira, Gibraltar, Algiers, Monaco (the Riviera), Naples, Alexandria (for Egypt and the Nile), Haifa for Jerusalem and Athens (Phaleron Bay).

Ample time for delightful visits ashore.

Shore excursions optional.

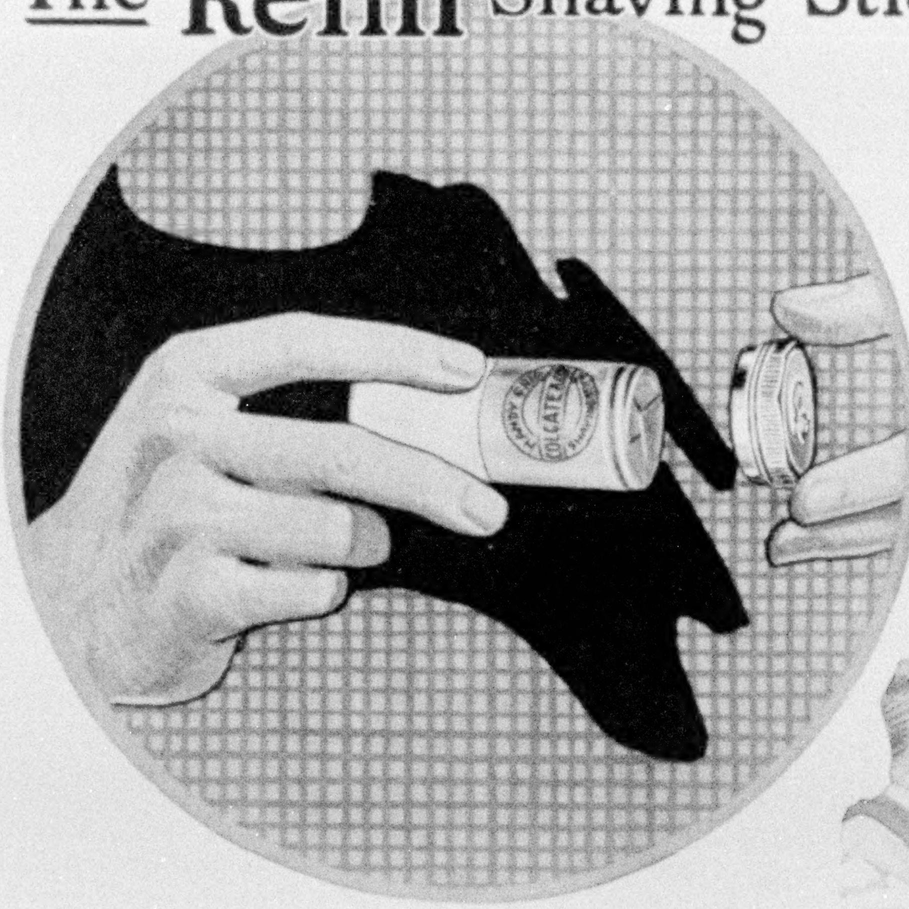
Beautiful color booklet MI sent on request

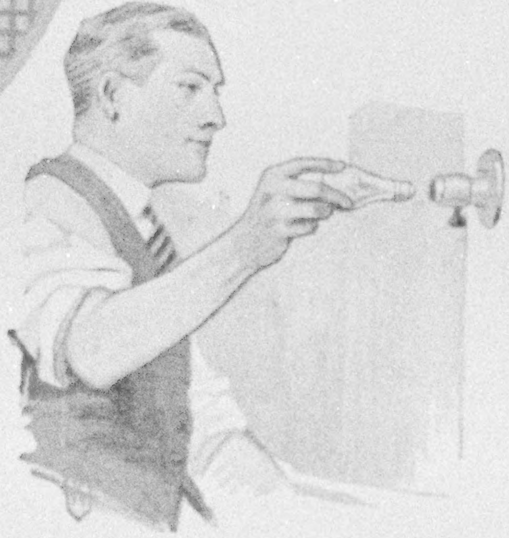
WHITE STAR LINE
AMERICAN LINE **RED STAR LINE**
INTERNATIONAL MERCANTILE MARINE COMPANY
No. 1 Broadway, New York

COLGATE'S

"HANDY GRIP" REG. U.S. PAT. OFF.

The Refill Shaving Stick





Like putting a new light bulb in a socket

YOU need not buy a new "Handy Grip" with each Colgate Refill Shaving Stick.

The "Handy Grip" lasts for years. Putting in a "Refill" is like putting a new light bulb in a socket.

The metal "Handy Grip," containing a trial size stick of Colgate's Shaving Soap, sent for 10c. When the trial stick is used up you can buy the Colgate "Refills," for the price of the soap alone. There are 350 shaves in a Colgate Shaving Stick—double the number you can get from a tube of cream at the same price.

The stick is the most economical form of shaving soap. We can give you this assurance impartially, since we make shaving powder and cream, as well as shaving sticks. But if you *prefer* cream, you will acknowledge when you have shaved with Colgate's Rapid-Shave Cream that you never knew before how good a shaving cream could be. It is one of our latest products, made on a new principle, and brought to perfection after years of scientific effort.

COLGATE & CO. *Dept. 66* 199 Fulton Street, New York

Ball Room Beauty

for any floor in your home

Maple is the accepted floor for dancing The glass-like polish which it naturally takes is increased by friction Its hard, tough, close-grained texture shows no wear.

And who can forget its beauty? How often, as in a mirror, have you seen each attractive detail of the ball room enhanced by the glistening surface of this flooring.

Floor with Maple when you build, and have the ideal floor for dancing when you want it—and the lustre of the ball room floor always with you. In home or apartment, Maple is the coming flooring. In office, church, school, public or industrial buildings, it has long been the choice of owners and architects.

BEECH *and* BIRCH

Beech and Birch are closest akin to Maple. These three floorings give you a range of color possibilities which meet all requirements. Under the MFMA trademark are sold the climate-hardened, slow-growth floor woods of Michigan and Wisconsin—you get Maple, Beech and Birch at their finest in the products of the Maple Flooring Manufacturers Association.

Ask your lumber dealer or write us for "Color Harmony in Floors," illustrating new decorative possibilities.

MAPLE FLOORING MANUFACTURERS ASSN.
1044 Stock Exchange Building, *Chicago*

The letters **MFMA** on Maple, Beech or Birch flooring signify that the flooring is standardized and guaranteed by the Maple Flooring Manufacturers Association, whose members must attain and maintain the highest standards of manufacture, and adhere to manufacturing and grading rules which economically conserve every particle of these remarkable woods. This trademark is for your protection. Look for it on the flooring you use.

MFMA

Floor *with* Maple
Beech *or* Birch

Distinctive Homes FarQuar Heated
Residence of U. G. Race, Detroit

Fresh Air Essential to Healthful Heating

TOO many people forget the relation of fresh air and adequate ventilation to the healthful heating of the home. Heat, without ventilation, becomes "stuffiness"—a lack of pure, fresh air. And you can't get successful ventilation by merely opening windows. Such a practice defeats your purpose.

Ventilation should be part of the heating system to insure successful results. Thousands have found this true with

THE FARQUAR SANITARY HEATING AND VENTILATING SYSTEM

Home heating should be made safe and healthful as well as comfortable and economical. And yet thousands forget the danger of common "coal gas" or fire poison.

Carbon Monoxide is a dangerous combustion gas or fire poison, common to all heating systems. It quickly penetrates through cast iron, which heat makes porous, while it is almost impossible to prevent leakage of gas through the joints and seams of a riveted fire-box.

The only safe protection is a one-piece steel fire-box, made continuous and imperforate by seamless-welding, thus making gas leakage impossible. Such a fire-box is an exclusive and patented feature of the FarQuar System.

If you would have the most delightful and healthful of all heating methods which gives a fresh and invigorating atmosphere, write for our beautiful and interesting free booklet, "The Science of House Heating." You will enjoy its wonderful message.

Exclusive
"FARQUAR"
Features
and
What They Mean

Electrically Welded One-Piece Steel Fire-Box Positively prevents contamination of air by gases or fire poisons.

Large Fire-Box with large grate area insures slow combustion and fuel efficiency.

Vent and Return System. Provides a generous supply of gently warmed, pure, fresh air instead of a hot blast of super-heated air.

Automatic Regulator actuated by fire-box, completely controls fire insuring uniform temperature regardless of weather, with surprisingly low fuel consumption.

The
Farquhar
Furnace Co.
909 FarQuar Bldg.
Wilmington, Ohio

Good Buildings Deserve Good Hardware

CORBIN

Your Doors—open willingly and close securely—always—with Good Hardware.

Why is it that some doors render grudging service, while others oblige with cheerful alacrity? Is it not largely a question of locks?

Corbin locks are Good Hardware. But don't stop with putting one on the front door. There are Corbin locks for your rear door—your garage door—vestibule door—fruit-closet door—and for all other doors in your house.

Corbin locks *work*. They have the spirit of co-operation. They meet you half way. Every Corbin key has a perfect understanding with its Corbin lock. Your Corbin Master Key is the master of any number of locks which you want it to open.

Corbin locks are made in a wide variety of enduring designs to harmonize with every architectural environment. They give utmost security. They add to the appearance and to the investment value of any building.

Do not overlook the importance of Good Hardware. To do so is short-sighted. Whether you are planning a seven-room cottage or a seventeen-story office building, you want Good Hardware. You can afford no other kind.

Talk with the local Corbin dealer. Get the advice of your architect. They know, better than most people, that "good buildings deserve good hardware."

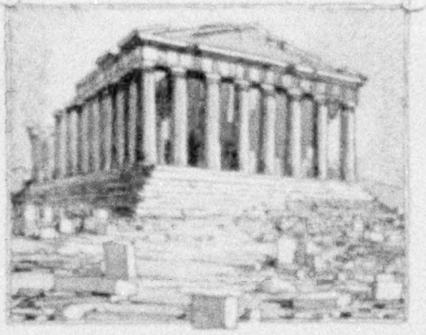
CORBIN
Good Buildings Deserve Good Hardware

If interested in building, write to nearest Corbin office or ask the local Corbin dealer for your copy of "Good Buildings Deserve Good Hardware."

P. & F. CORBIN SINCE 1849 NEW BRITAIN CONNECTICUT
The American Hardware Corporation, Successor
NEW YORK CHICAGO PHILADELPHIA

XUM

CUNARD
and ANCHOR Lines



to the
Mediterranean

AN EXCEPTIONAL OPPORTUNITY

Special Fall and Winter Sailings

from New York by

TUSCANIA* —*October 26*
—*December 6*
SCYTHIA —*November 25*
CARONIA —*February 10*

To Madeira, Gibraltar, Algiers, Monaco (Riviera), Genoa, Naples (Rome), Piraeus (Athens), Constantinople, Alexandria (Cairo)—according to itinerary and steamer selected.

**Tuscania* also calls at Vigo

Stop-overs and return trips via North Atlantic may be arranged.

Apply

CUNARD
and ANCHOR Lines
25 Broadway New York
or Branches and Agencies

A warning
-bleeding gums

ARE your gums tender? Do they bleed when brushed? If so—watch out for Pyorrhea.

This disease of the gums, which afflicts four out of five people over forty, not only destroys the teeth, but often wrecks the health.

In Pyorrhea the gums become spongy, then recede; the teeth decay, loosen and fall out—or must be extracted to rid the system of the infecting Pyorrhea germs which breed in pockets about them. These germs lower the body's vitality and cause many diseases.

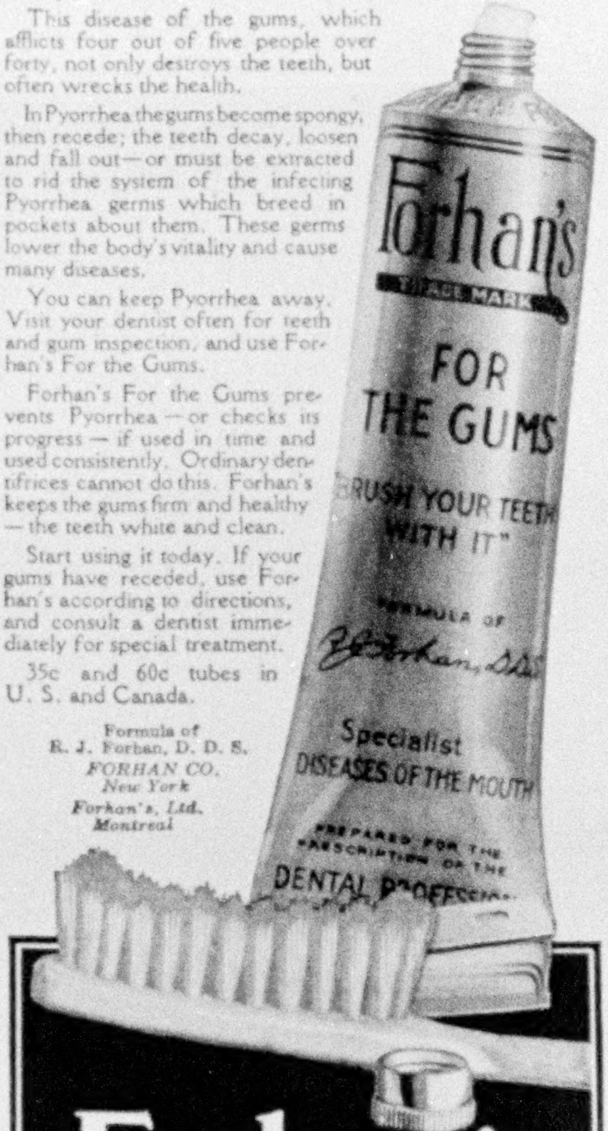
You can keep Pyorrhea away. Visit your dentist often for teeth and gum inspection, and use Forhan's For the Gums.

Forhan's For the Gums prevents Pyorrhea—or checks its progress—if used in time and used consistently. Ordinary dentifrices cannot do this. Forhan's keeps the gums firm and healthy—the teeth white and clean.

Start using it today. If your gums have receded, use Forhan's according to directions, and consult a dentist immediately for special treatment.

35c and 60c tubes in U. S. and Canada.

Formula of
R. J. Forhan, D. D. S.
FORHAN CO.
New York
Forhan's, Ltd.
Montreal



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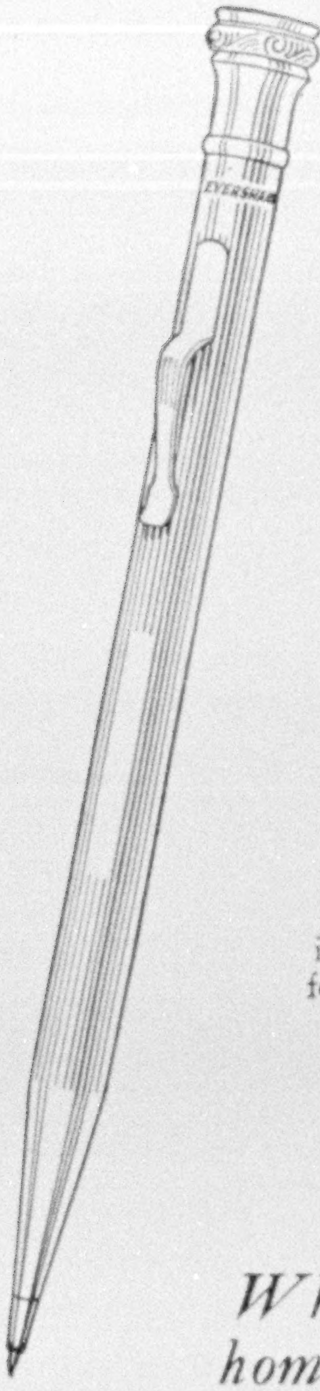

When you say, "Now study hard," give him an

EVERSHARP

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You cannot guide his hand, but you can put an EVERSHARP in it—for good marks. EVERSHARP itself is a wonderful example of efficiency. Perfect in operation; dependable, it is made with precision and assembled in a space no larger than an ordinary lead pencil. The exclusive EVERSHARP rifled tip makes EVERSHARP supreme in writing ability. No other pencil can have this rifled tip that keeps the lead from slipping. Priced from 50c to $50, in gold, silver and enamel, and with hold-fast clip for pocket, or ring for chain.

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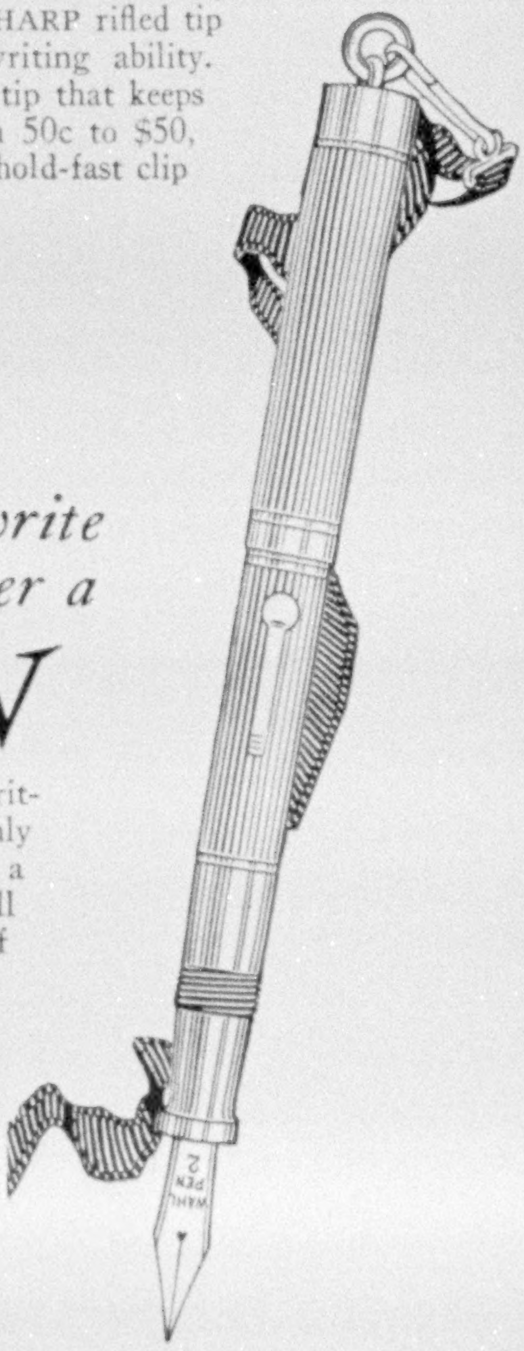

You know yourself that the desire to keep on writing is strongest when the words flow smoothly from the pen, without blot or sputter. Put a WAHL PEN in her hand and each letter will prove that easy, smooth writing is a matter of pen perfection. The everlasting all-metal barrel holds more ink, prevents leaking, will not crack like hard rubber, and may be had in designs to match EVERSHARP. Sold with clip or with ring for suspending from ribbon or chain, as is the fashion nowadays. Priced as low as $4. Unequaled in durability and attractiveness.

Made in U. S. A. by THE WAHL COMPANY, CHICAGO
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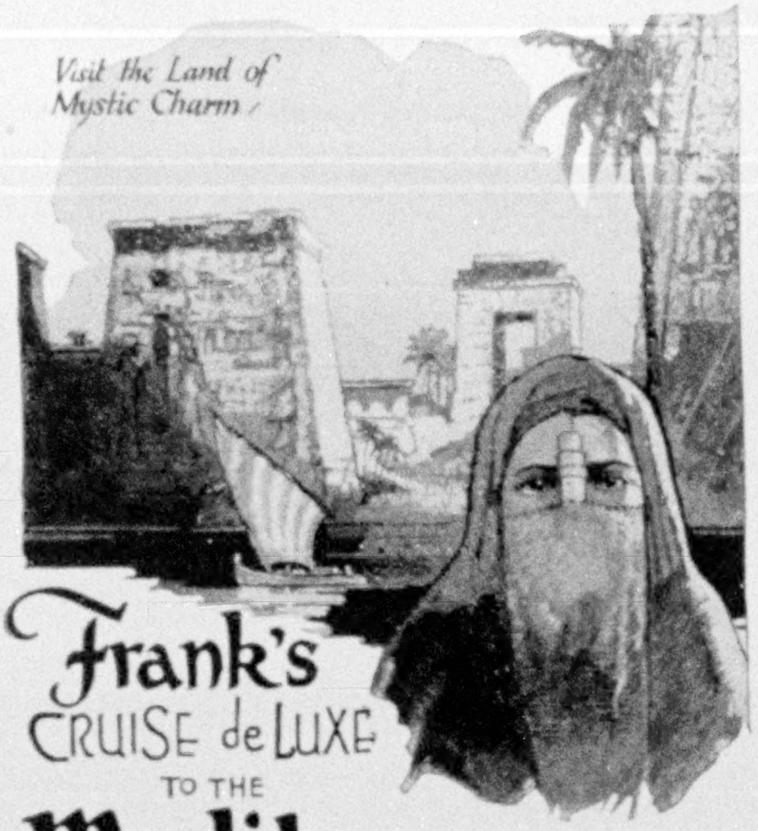
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THIS book contains practical suggestions on how to make your home artistic, cheery and inviting. Explains how you can easily and economically refinish and keep furniture, woodwork, floors, and linoleum in perfect condition. Tells what materials to use and *how* to use them. Includes color charts, gives covering capacities, etc.

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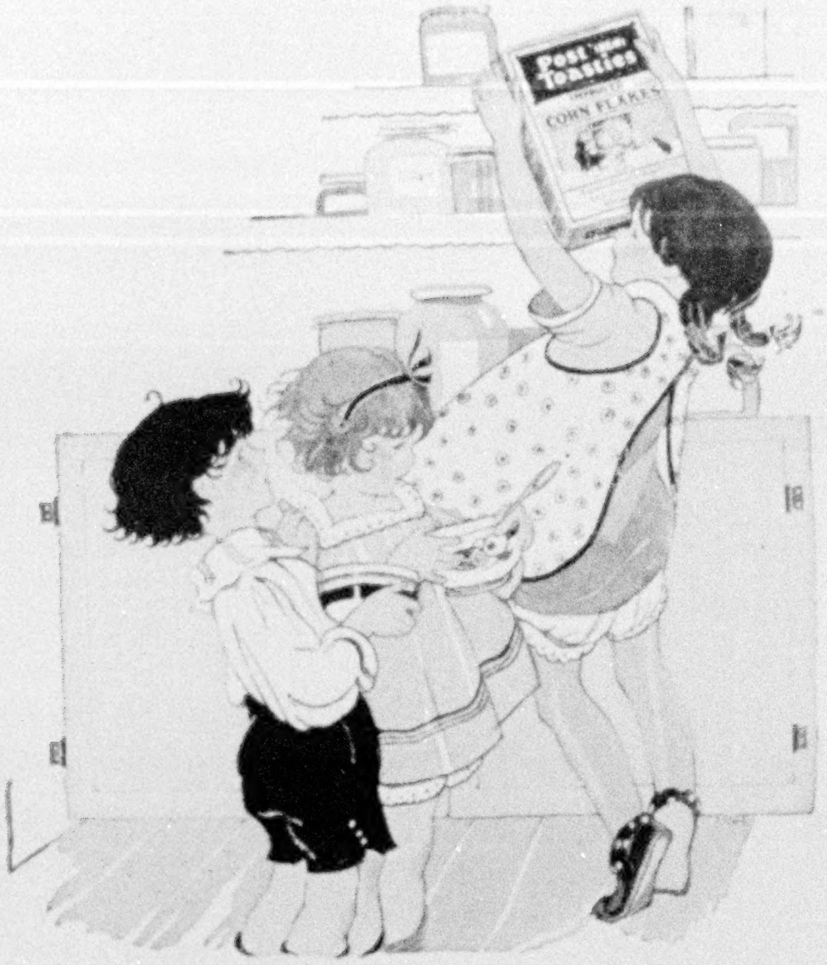

When appetite has its wish

—it will keep on having Post Toasties, once it has known the charm of these delicious, golden-brown flakes of toasted corn.

So easy to serve, so quick to respond to appetite's call—and such a wonderfully satisfying goodness!

Post Toasties are made from choice American corn, seasoned, processed and toasted *just right*—kept fresh and flavory in the wax-sealed package, ready to be poured into the bowl as a feast of joy. Add cream or milk and the meal is ready—crisp and good to the last flake in the dish.

There's a call to happiness at breakfast, lunch-time, or between meals, in Post Toasties. Be sure to order by name, and get the Yellow and Red package.

Always in Good Taste—

Post Toasties

—improved corn flakes

Made by Postum Cereal Co., Inc., Battle Creek, Michigan.

A Character Study of Curwood by James Montgomery Flagg

2,000,000 people have bought this man's books!

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FOR years every novel he has written has out-sold its predecessor — his photoplays have packed the theatres of the world. And now he has beaten *all* of his previous work with a wonderful novel of wilderness love.

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..............................192

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Occupation ....
(This information is important for the records.)

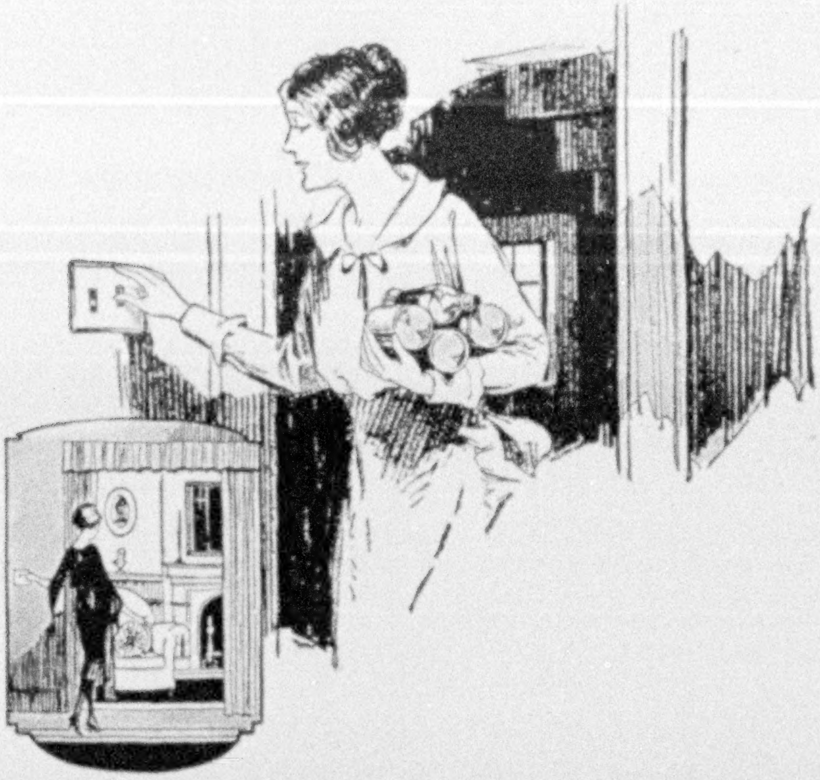
Address ....

....

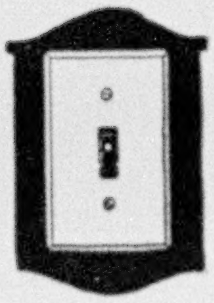
for membership in the Society

....

9-22 .... Name and Address of Nominating Member



The cellar stairs teach a lesson for the whole house



The G-E Tumbler Switch works with a touch of the elbow or a flip of the finger

IF you have had, in your home, a measure of electrical convenience, you have known how handy it is to control your cellar light from upstairs. A little planning will make the whole house just as convenient. You should have switches where you want them; to control your lights from the front door, or the back or from your bedroom.

ELECTRICAL devices are willing servants, but you must be sure that they can be put to work when and where you want them.

YOUR home, no matter how small, should have several convenience outlets in every room so that your fan, your lamps, or your other electrical servants may be used at any point, several at the same time, if need be.

A New Booklet for Home Lovers

How to secure this electrical convenience in each room of your house is told in detail in a booklet prepared for you. This booklet will be sent you free, together with the name of a nearby electrical contractor qualified to assist you in planning adequate electrical convenience for your home. And if you now own your home you can have the work done on an easy payment plan, just as you buy a piano or phonograph.

If you own or rent a home, or ever expect to, you will find this booklet well worth reading. Address Section N, Merchandise Department, General Electric Company, Bridgeport, Conn.

The Home of a Hundred Comforts

What Is Your Address?

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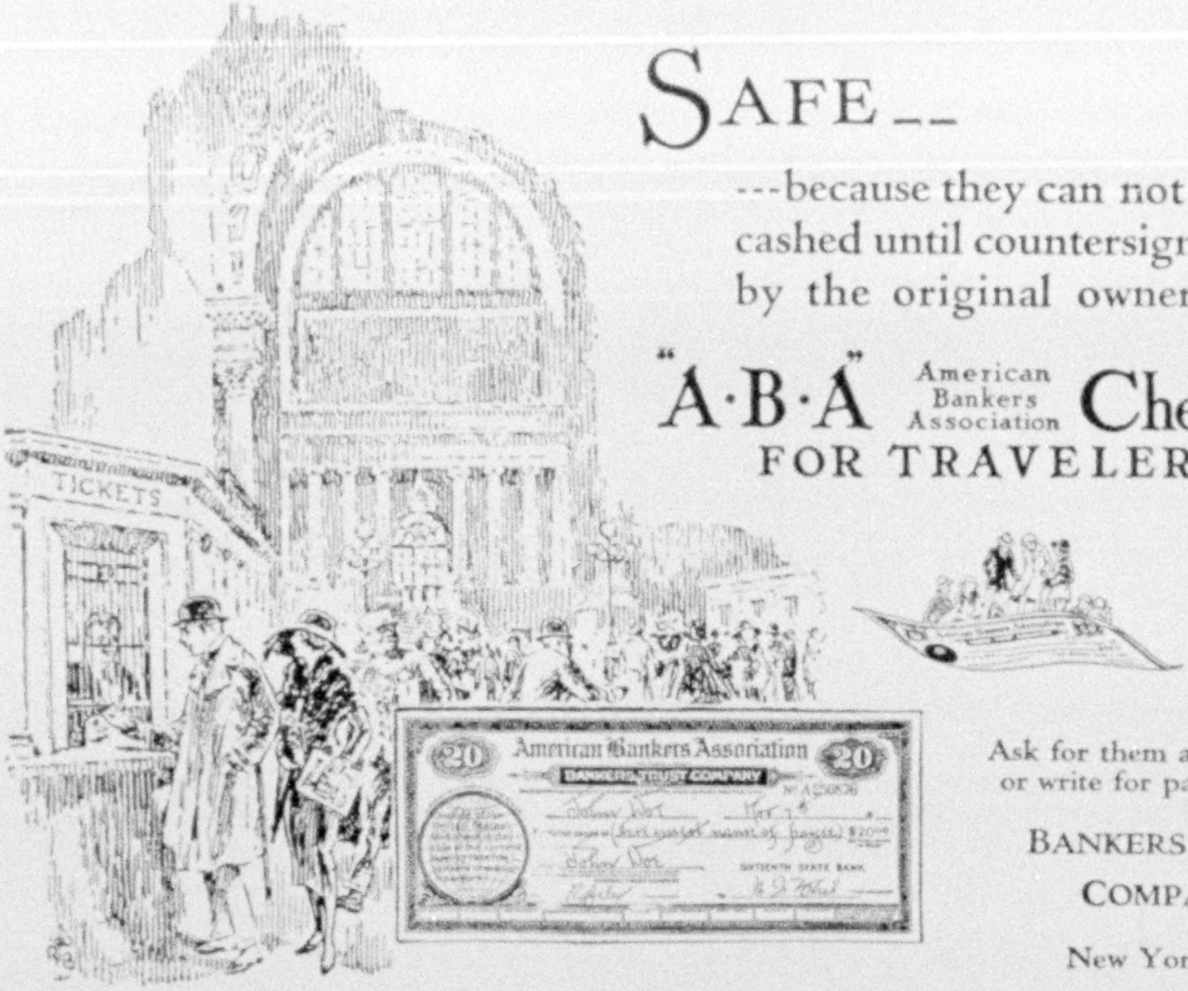

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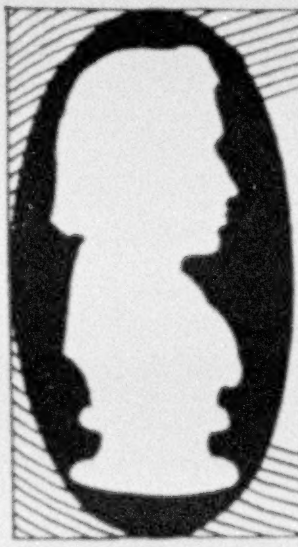

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4 MONTHS' CRUISE, $1,000 and up
Including Hotels, Fees, Drives, Guides, etc. 14 days Japan, option 19 days India, and other interesting places.
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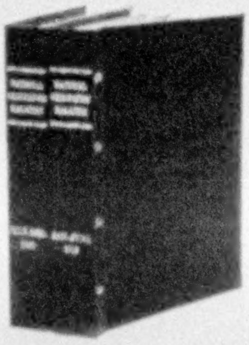

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Use PLATE Glass

No other glass will do

PLATE glass is the right glass for hotel, office-building, apartment or house. In strength or appearance it cannot be equaled.

Plate glass is made to withstand the sudden changes in air pressure and the strong winds encountered on the upper floors of buildings. It is made to give clear vision from any angle without distortion. Looking through plate glass from the inside is like looking through the clear air itself.

The beauty of plate glass from the outside lies in the true reflection of objects—clear and sharp without the distortion of waves or swirls.

Plate glass registers an immediate impression of architectural refinement. The effect is the same in any building or house. Cheaper quality may be substituted in some materials without any great change in the appearance of the building. But substitution of common glass for plate glass is immediately apparent.

See that plate glass windows are written into the specifications. Ask any glazing contractor for prices on both plate glass and common glass. The difference in price is astonishingly small, and is more than compensated by increased rentability.

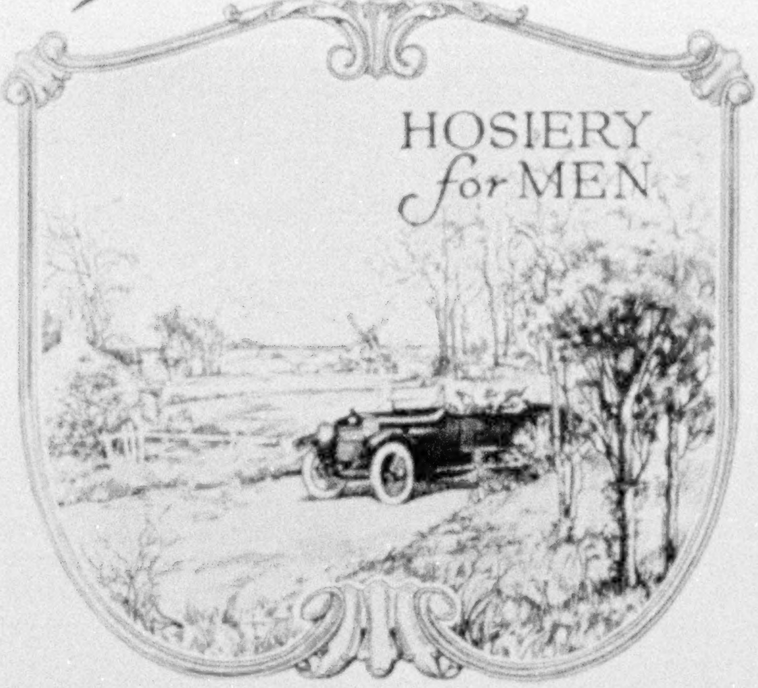
PLATE GLASS MANUFACTURERS *of* AMERICA

Genuine
PLATE GLASS
MADE IN U.S.A.

Use Plate Glass for:
- Table Tops
- Desk Tops
- Windshields
- Closed Car Windows
- Window Ventilators
- Mirrors

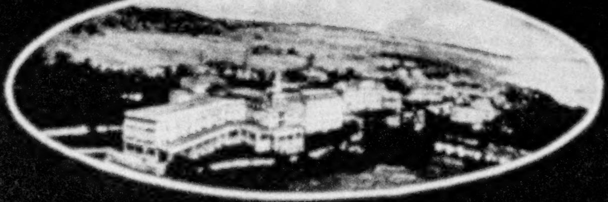
Nothing Else
is Like it

Shawknit
TRADE-MARK
REG. U.S. PAT. OFF.



A MAN remembers to ask for Shawknit Hosiery. *Previous experience* has taught him that it is a most satisfactory investment.

SHAW STOCKING CO.
Lowell, Mass.



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All advantages of European Spas without strain of ocean trip. Nauheim baths given with natural calcium chloride brine. Sporty golf course.

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NATIONAL GEOGRAPHIC SOCIETY
WASHINGTON, D. C.

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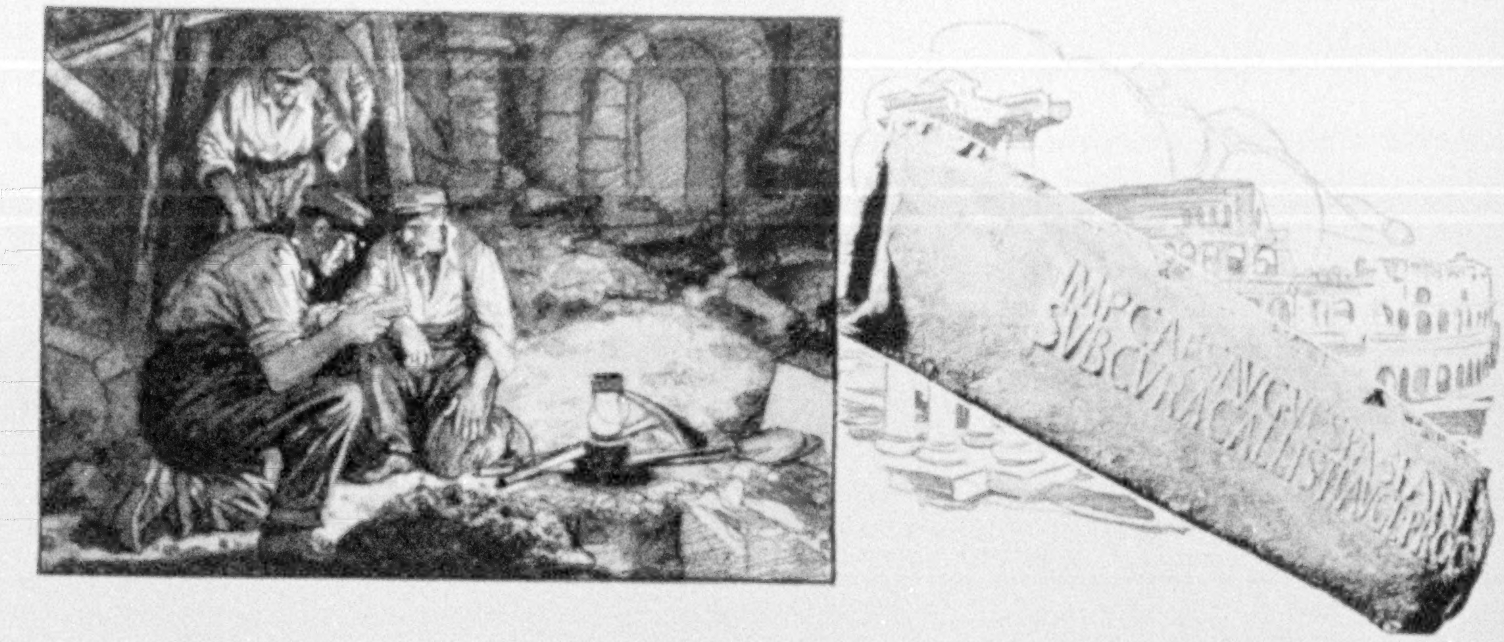

Empires perish, but lead pipe lasts

THIS piece of lead pipe had been buried in the ground nearly 1,900 years when it was dug up by workmen excavating for a subcellar in Rome.

Vespasian was emperor when this pipe was made—the inscription tells that. When Vespasian laid water-pipes of lead in the streets of Rome, he followed the example of Julius Cæsar, who sent plumbers with his legions into barbarian lands. Lead pipe laid by these Roman invaders has been dug from English soil.

For centuries lead's non-corrosive qualities have made it the favored metal for water-pipes. Lead gutters, pipe-heads, and leader pipes have been used for hundreds of years to carry off the rain from the roofs of buildings. Such lead work is often very beautiful and ornamental.

Often you see a steel skeleton, a bridge, a roof, a railing that has been painted a flaming orange-red. This brilliant coat is red-lead, an oxide of lead. "Save the surface and you save all" is an imperative maxim where exposed metal surfaces are concerned, and red-lead is the most reliable protection against rust that has yet been discovered.

You are surrounded by lead, in your home and on your travels. There is lead in the rubber heels of your shoes, in the tires of your automobile, in the bearings of the machinery that makes things for your use or transports you from place to place.

Civilization has found hundreds of uses for lead and its products, and of them all the use of white-lead in paint is undoubtedly the most important.

Paint is used to decorate and preserve almost everything that is built or made, and the principal factor in good paint is white-lead—made by corroding pure metallic lead and mixing it with linseed oil.

Most painters simply add more linseed oil to the white-lead, in order to make the paint they use. Paint manufacturers use white-lead, in varying quantities, in the paint they make. The quality of any paint is largely dependent on the amount of white-lead it contains, for it is the white-lead that gives to good paint its durability.

"Save the surface and you save all" means that paint prevents decay and ruin. The highest *protective* power is found in those paints which contain the most white-lead.

National Lead Company makes white-lead of the highest quality, and sells it, mixed with pure linseed oil, under the name and trademark of

Dutch Boy White-Lead

Write our nearest branch office, Dept. F, for a free copy of our "Wonder Book of Lead," which interestingly describes the hundred-and-one ways in which lead enters into the daily life of every one.

"Save the surface and you save all"

NATIONAL LEAD COMPANY

New York Boston St. Louis San Francisco
Cleveland Buffalo Chicago Cincinnati

JOHN T. LEWIS & BROS., Philadelphia
NATIONAL LEAD & OIL CO., Pittsburgh

Some Products Made by National Lead Company

Dutch Boy White-Lead
Dutch Boy Red-Lead
Dutch Boy Linseed Oil
Dutch Boy Flatting Oil
Dutch Boy Babbitt Metals
Dutch Boy Solders
Came Lead
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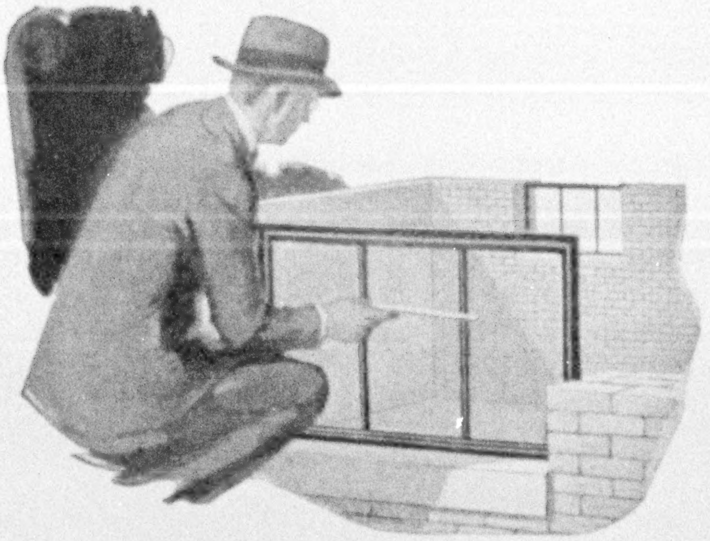
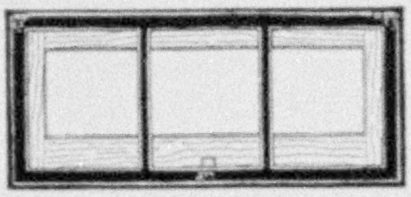
Lead Oxides
Shot
Lead Wool
Litharge
Basic Lead Sulphate—White and Blue



How Much Daylight For Your Basement?

When you put in windows you buy that much daylight. The more bright, cheerful daylight the windows admit into your basement the better is your purchase.

83% More Daylight



In this illustration an actual Truscon Steel Basement Window is superimposed upon a wood window of same size. Note that the space occupied by the entire steel window including the frame and sash is no greater than that of the wood frame alone. Thus the 33¾" x 15" Truscon basement window admits 83% more health-giving daylight while even the larger 33¾" x 23" window admits 46% more.

Other Advantages

Get more daylight at lower cost

Truscon Steel Basement Windows can't stick or warp. They are always easy to open and close. They lock automatically. Their double contact weathering effectively keeps out wind, rain and snow. They are simple to install. Truscon Steel Basement Windows are furnished complete—no extra expense, as with wood sash and frame, for hardware, labor of fitting and priming coat of paint. Based on daylight area Truscon Basement Windows cost much less.

Return Coupon for Full Information

TRUSCON STEEL COMPANY
YOUNGSTOWN, O. Warehouses and Sales Offices in Principal Cities

TRUSCON STEEL BASEMENT WINDOWS

Truscon Steel Co., Youngstown, O.
Send me information on Truscon Steel Basement windows. I am............Owner............
Architect............Contractor............Dealer............
Name............
Address............ NG8

Your Casements to be Satisfactory must be adjustable

MONARCH
Automatic CASEMENT STAY

Holds your window securely at any angle without rattle. Can be applied to any casement—right or left, top or bottom—concealed or exposed.

Satisfactory friction assured by a slight turn of outer tube.

Send for "Casement Windows"—a booklet that points the way to casement window satisfaction.

MONARCH METAL PRODUCTS CO.
4900 Penrose Street
St. Louis, Mo.

Sani-Flush
Reg U S Pat Off

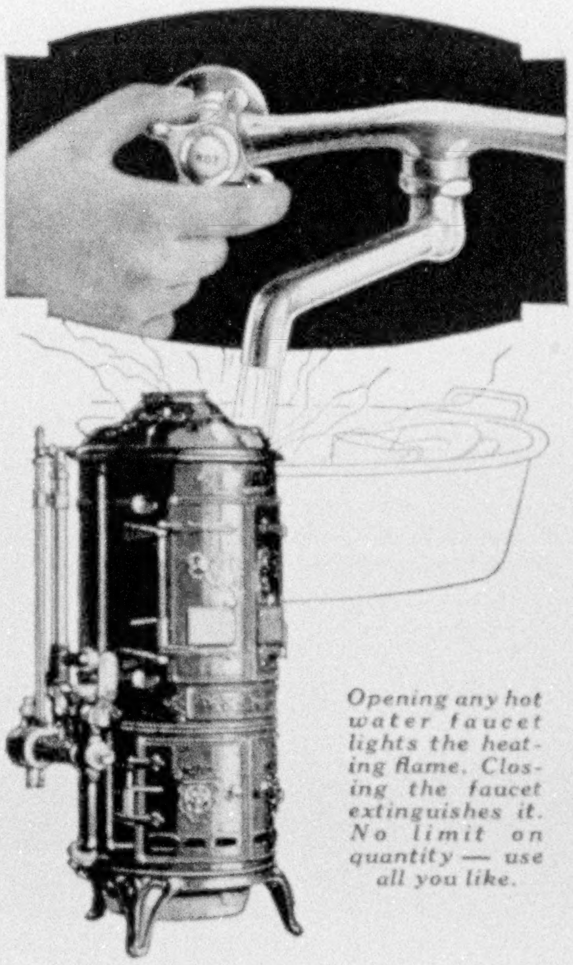
Cleans Closet Bowls Without Scouring

Sprinkle a little Sani-Flush into the bowl, and flush. It removes all stains and incrustations. It keeps the bowl and hidden trap clean and odorless. Keep it in your bathroom.

Sani-Flush is sold at grocery, drug, hardware, plumbing and housefurnishing stores. Price, 25c.

THE HYGIENIC PRODUCTS CO., Canton, Ohio
Canadian Agents: Harold F. Ritchie & Co., Ltd., Toronto

How Up-to-date is Your HOT WATER Service?



Opening any hot water faucet lights the heating flame. Closing the faucet extinguishes it. No limit on quantity — use all you like.

CAN you now draw hot water instantly, without walking a step farther than the nearest faucet? Do you *always* have abundant HOT water? If not, then you are missing a great home convenience; *flowing hot water, heated without attention—on tap 24 hours every day.*

The Pittsburg heats water as you draw it. No rust; no sediment; no tank. The heating flame lights automatically whenever you turn on a hot water faucet. Economical, because it heats only the quantity of water actually needed.

Look up the Pittsburg dealer in your city (the gas company or one of the prominent plumbers) or write us how many hot water faucets in your home and the number of people in your family. We will recommend the proper size Pittsburg for your needs, and send you a free copy of "The Well Managed Home."

PITTSBURG WATER HEATER CO.
Pittsburgh, Pa.

Pittsburg
AUTOMATIC GAS
WATER HEATERS

Send the Coupon

Chamberlin Metal Weather Strip Co., Detroit, Mich.

Tell me the cost of equipping my building with Chamberlin Metal Weather Strips (check whether home, factory, office building, church, school).

Give number of outside doors ____________________
windows ____________________

Name ____________________
Address ____________________
City and State ____________________
Eng. Dept. A

Save Fuel
Keep Warm
End Draughts

You will be surprised at the small cost of equipping your home or business building with Chamberlin Metal Weather Strips.

And they add so much to comfort, cleanliness and good household economy. They save 25% to 40% of fuel costs. Keep dirt, dust, soot and smoke from sifting in. That ends one of the most tedious tasks of housework.

Why Heat Your Building 36 Times Every Day?

Tests show the inrush of cold air at unprotected windows and doors fills the average building 36 times daily. Why fight this with fuel?

How much more simple to bar it out as thousands of good home managers do, with Chamberlin Metal Weather Strips.

At 12,000,000 windows and doors Chamberlin Metal Weather Strips permanently end fuel waste and discomforts resulting from draughts. They make homes dust-proof. Protect hangings, furnishings and decorations. End rattling doors and windows.

Healthier homes result. Children are safe from cold air currents. No cold spots. You are not driven from the bright, cheerful window by chill draughts.

Free Chamberlin Strips are used on 85% of all weather stripped buildings, including homes, banks, schools, office buildings, churches, stores, hotels and apartments.

They are guaranteed to last as long as the building. Any need for service or attention, no matter how many years hence, is cheerfully done free, by Chamberlin experts. An estimate by our engineering department, on the cost of your equipment, is free. Just send the coupon.

CHAMBERLIN
METAL WEATHER STRIPS
"SINCE 1893-THE STANDARD"

Inertia or Analysis—*Mr. Executive*

HAVE you stopped to think why so many of the world's shrewdest buyers of advertising space are steady and increasing users of THE GEOGRAPHIC?

The answer opens up to you, too, the vast and rich market presented by its 700,000 SOLID FAMILIES.

These result-demanding advertisers know to a nicety the amazing degree to which it has the ear of executives and the super-incomed as well.

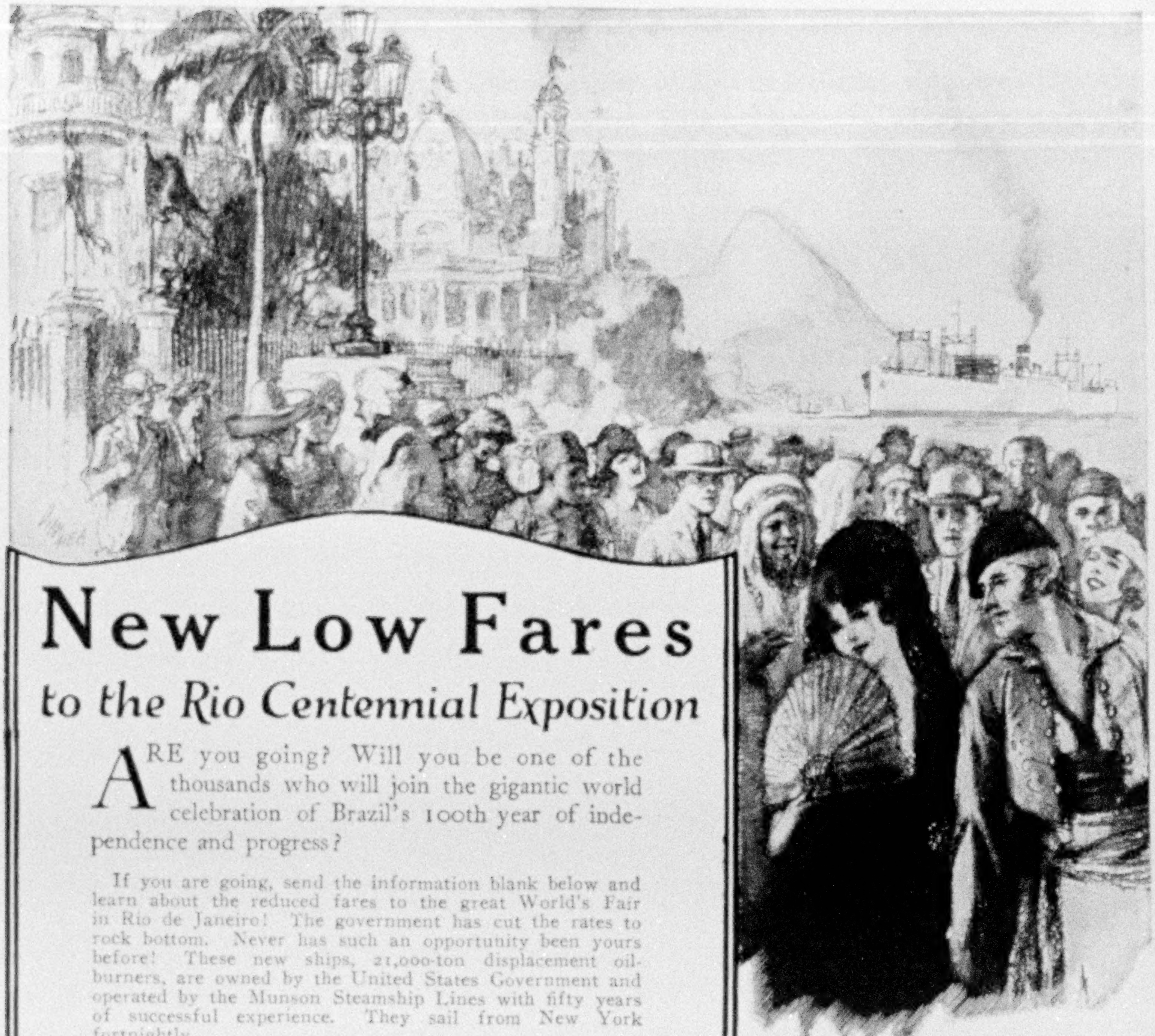
They have been steadily banking the profits it creates for products and services that appeal to Solid People who are intelligent and well-to-do but expect money's worth.

You already know THE GEOGRAPHIC from the reader's standpoint—realize its great and lasting appeal to your family and your friends.

But as a business man, can you afford to know less than your competitors know and apply about its active selling power in these other 700,000 solid homes—it is too profitable an opportunity to leave to chance, inertia or advertising rut.

Have your secretary write today for "Facts for Analysts."

The National Geographic Magazine
Washington, D. C.



New Low Fares

to the Rio Centennial Exposition

ARE you going? Will you be one of the thousands who will join the gigantic world celebration of Brazil's 100th year of independence and progress?

If you are going, send the information blank below and learn about the reduced fares to the great World's Fair in Rio de Janeiro! The government has cut the rates to rock bottom. Never has such an opportunity been yours before! These new ships, 21,000-ton displacement oil-burners, are owned by the United States Government and operated by the Munson Steamship Lines with fifty years of successful experience. They sail from New York fortnightly.

Only 11 Days to Rio

On these great government ships Rio de Janeiro is only 11 days away; Montevideo and Buenos Aires are but a few days beyond. *Your* ships make the fastest time and bring South America's opportunities nearer now than ever before.

The ships are among the finest afloat and offer every comfort and convenience known to ocean travel. If you are planning an ocean trip, send the information blank below. Find out what *your* ships offer, you will be under no obligation. Write today!

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In the beginning we set out to build a car that should, above all else, be true to our ideals.

We went about our work slowly and with great care and from our labors came the LaFayette.

Since the day our first car left the factory the name LaFayette has advanced without falter.

It has become, perhaps, the proudest name that is placed upon a motor car.

The LaFayette has come into its own, just as surely as any product of human skill which is made unsparingly fine must come into its own.

It has come into its own because it has brought to motoring a new expression of performance, of reliability, of distinction and of grace.

For upon each car we have lavished the same watchful and jealous care with which the builder of a cup-defender oversees the laying of his keel.

It is not our goal to build in great numbers, but rather, to build in great excellence for those who love fine things.

An ideal, perhaps, but the same ideal with which we started, the ideal which has guided the LaFayette so surely to its own.

LAFAYETTE MOTORS CORPORATION at *Mars Hill*, INDIANAPOLIS

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a New Big HOOVER

for Hotels, Clubs, Offices, Large Residences, etc.

IT BEATS
as it Sweeps
as it Cleans

Wherever carpetings are luxuriously deep and hard to clean, many in number, or exposed to continual traffic, a radically better, faster and cheaper method of cleaning them is introduced by this wonderful *new big* Hoover.

There is nothing to rival it at any price!

It is virtually "fool-proof." It is built for continuous hard work and rough usage.

No oiling is ever necessary. For it has a dustproof, *ball bearing* motor. This motor also runs, without change, at uniform speed on either alternating or direct current, a revolutionary achievement.

The new Hoover is simplicity itself. Ordinary help can easily operate it. Extremely strong suction is provided for the air-cleaning attachments.

Many other new, exclusive features distinguish it.

We guarantee this Hoover to thoroughly beat, sweep and suction clean *even the thickest rugs*, and to add years to the life and beauty of *all* rugs.

In this manner, and through reduced labor costs, its moderate cost will be saved over and over again.

Have an immediate demonstration! Phone any Hoover Branch Office, or write us for names of Authorized Dealers. The Hoover also comes in two smaller sizes. 17c to 23c a day soon pays for one, on the divided payment plan.

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The oldest and largest makers of electric cleaners
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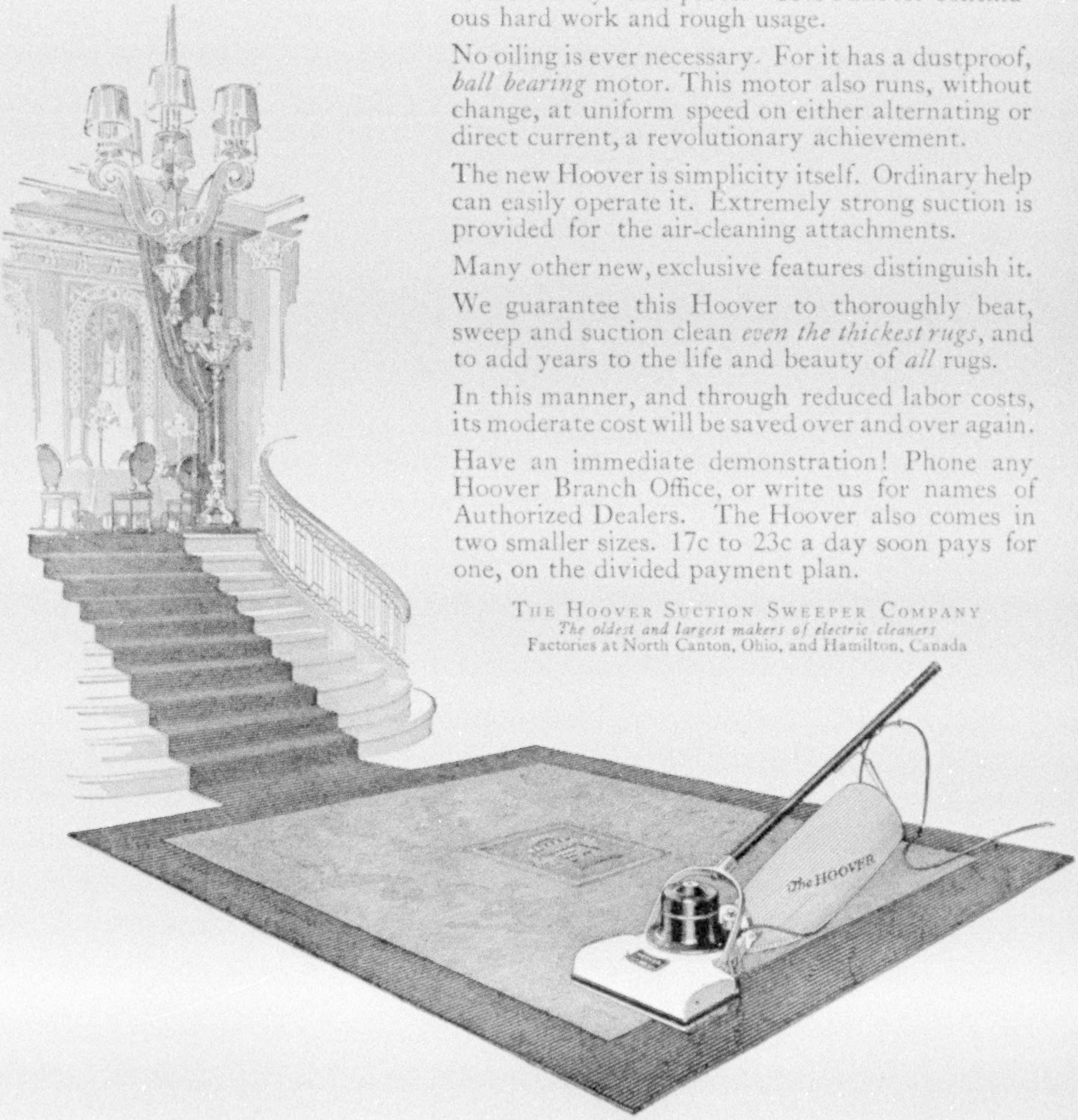

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Silvertown
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TUBE
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HEAVY DUTY

Motor Mate of the Silvertown Cord

What Silvertown is to tires, Silvertown is to tubes, for all that Silvertown means in a cord tire, Silvertown means in this new and unusual red tube.

It is the de luxe tube for *any* tire, made for those motorists who are willing to pay a little more for a tube that is extra fine.

The Silvertown is an unusually thick, heavy duty tube. The very feel and stretch of its velvety red rubber gives you confidence in it.

Goodrich Dealers have the new Silvertown Tube in all sizes.

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